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The Use of Hearing Aids in Zimbabwean Schools

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Albert R. Gwitimah

A thesis
submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of
Master of Education
in Special Education

Department of Educational Psychology

Edmonton, Alberta
Fall 1994

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Prof. Mary Ann Bibby, Supervisor

Fern Snart
Prof. Fern Snart

Sue Haske
Prof. Sue Haske

Date: July 11, 1994

To my mother, Pamhayi Lucia Gwitimah; her sister, Margareth Gwitimah; and my late father, Pazorora Gwitimah, who inspired me to aspire after something better through education.

To my wife, Margareth Mary Gwitimah, for her untiring support throughout my studies at the University of Manchester (U.K.) and the University of Alberta (Canada).

To my children, Tafadzwa Lucia, Pazorora Albert, Tinotenda Philip, and Nyaradzai Emelda, who had to forego my fatherly care while I pursued my studies.

Abstract

Hearing aids facilitate hearing, and, like any other assistive device, they are subject to misuse and abuse by those using them. The main purpose of this study was to investigate hearing-aid use in Zimbabwean special Schools for the Deaf as well as in integrated units. The primary purpose was to determine where and how changes might be made to improve hearing-aid effectiveness and benefit to children who wear them. An additional purpose was to determine whether teachers were sufficiently knowledgeable about hearing aids.

Structured questionnaires which included demographic, knowledge, and attitude sections were given to 89 teachers, and, using a descriptive qualitative design, 19 interviews were carried out with teachers, heads of schools, deputy heads of schools, hearing-aid technologists, and a principal lecturer from the United College of Education.

Data analysis was descriptive, and the findings included some descriptive thematic patterns related to how interviewees responded and suggested how improvements in hearing-aid use could be made. The results indicate that the use of hearing aids in Zimbabwean schools is encouraging in spite of the many challenges. Problems are noted with the lack of spare parts and the need for more training and practical exposure of teachers to hearing-aid functions and components.

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Thank you to Dr. M. A. Bibby (my thesis supervisor) for her continuous kindness, honesty, encouragement, support, and fine editing skills; to Dr. S. Haske for helping me to refine my ideas and for her immeasurable support in my research; and to Dr. F. Snart for her friendship, support, and ongoing encouragement.

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Thank you to my family. The memory of my late father, who believed all things were possible with faith and diligence, will always be with me. And thank you to my wife, who believed in me when I did not think I could do it, and for always being there with humour, support, and love.

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Chapter 1

Introduction

The Problem

The provision of appropriate services for children who are hearing impaired has become an increasingly important concern for educators of the deaf in Zimbabwe, particularly in special Schools for the Deaf and integrated units. A growing awareness that hearing-impaired children should be fitted with hearing aids has led to a request for many different types and makes of hearing aids from all over the world. The need to ask for donations of hearing aids has, however, necessitated the current research. It has become apparent that if many hearing-impaired children are fitted with these donated hearing aids, teachers ought to have knowledge of hearing aids and how they function to help deaf children use these aids effectively and maximally.

According to Musket (cited in Roeser & Downs, 1988), "Among the factors which impact on the success of hearing-aid use are the teachers' knowledge of hearing aids, the attitudes of the teachers towards the hearing aids and hearing aids wearers" (p. 198). Within Zimbabwe no research has been reported on the use of hearing aids, and very little is known about the use of hearing aids. Studies in the U.S.A. from the early 1970s have indicated that hearing aids worn by children have a high rate of malfunction among hearing-impaired children (Martin, 1987), and there is no reason to doubt that it would be the same, if not worse, in Zimbabwe. One of the reasons for this is the "maple syrup syndrome" in which the hearing aid catches all sorts of debris and stops working.

Although the extent to which hearing aids contribute to optimal educational development has not been well defined (Davis, 1981), it appears logical that a hearing-impaired child would function and perform better in school when his/her hearing aid is functioning properly. The potential reason for the lack of routine monitoring of hearing aids in the classroom is a lack of training of teachers in this area.

The Purpose of the Study

The purpose of this research was to investigate hearing-aid use in Zimbabwean special Schools for the Deaf and integrated units to determine where and how changes might be made to improve their effectiveness and benefit to children who wear them. It has been amply demonstrated that there is a serious need for monitoring hearing-aid use in schools (Potts & Greenwood, 1983). Although it is evident from the literature that great strides have been made in certain areas in other countries (Stewart, 1981), it is unclear what monitoring services and knowledge are available in Zimbabwe, particularly in the area of hearing aids.

The objectives of this descriptive study were:

1. to investigate the extent to which hearing aids were used in Zimbabwean Special Schools for the Deaf and integrated units by observing and interviewing teachers, heads, deputy heads, and hearing-aid technologists;
2. to investigate teachers' specific and general knowledge of hearing aids as determined by scores on items in the questionnaire; and
3. to elicit suggestions through the use of interviews for improving the present services rendered to hearing-impaired children in schools.

Assumptions of the Study

The following assumptions were made in relation to this investigation:

1. The sample who filled in the questionnaires was large and comprehensive enough to make the survey results valid.
2. Respondents filled out the questionnaires honestly and accurately.

3. Respondents, for the most part, were knowledgeable about the hearing-aid situation.
4. The questions were clear and unambiguous.
5. The sample for the interviews was large enough to justify the validity of respondents' responses for the conclusions and recommendations.

Research Questions

The following research questions were used to guide the study:

1. Are teachers knowledgeable enough about hearing aids? Do they know (a) how they function, and (b) how to troubleshoot them, to enhance their use with children who are hearing impaired? (c) Could they rectify small problems, etc.?
2. Is hearing-aid use benefitting children at all?
3. Is there any relationship between teacher certification and specific or general knowledge of hearing aids?
4. What types of teachers teach in Schools for the Deaf and integrated units?

Significance of the Study

The critical significance of teachers learning about the value of hearing aids has been consistently identified by numerous authorities (Berg, 1987; Bess & Humes, 1990; Northern & Downs, 1984; Roeser & Downs, 1988; Sanders, 1993). However, in Zimbabwe no research has probed what should be done specifically by and for teachers who work daily with children wearing hearing aids. In the teacher-training course at the United College of Education, only since 1987 have some components on hearing aids and troubleshooting of hearing aids been taught.

Hearing aids are not complicated devices, and one can learn to monitor them. For success in the classroom, efficient and effective operation of a child's aid is important. Second in importance to efficient operation is the hearing aid's proper fit.

This is true regardless of the environment, either in special settings or in the mainstream. Appropriate amplification is also important. But electroacoustic characteristics must also be known, batteries must be available, and individual earmoulds are needed. The hearing aid should permit the hearing-impaired child to use his residual hearing maximally. In Zimbabwe it is the hearing aid which is at the base of a child's oral linguistic growth, for it is the child's principal contact with the oral world. Through his/her aid or aids, the child can hope to monitor the sounds of speech and learn the complex systems of vocabulary, grammar, and pragmatics which comprise human communication. Thus, in Zimbabwe hearing-impaired pupils should be urged to use hearing aids during every waking moment. Although the hearing aid is not a complicated device, it is a delicate instrument and must be handled properly. It needs attention to ensure good operation. If it is not working as it should, it will not help as it is intended. If those who are supposed to help in the maximum operation of it are not knowledgeable, the hearing aid will only be a bother to the child wearing it.

This study should help to make teachers and all involved in the education of hearing-impaired children in Zimbabwe aware of the importance of monitoring the functioning of hearing aids. This is also a responsibility of critical importance if hearing-impaired children are to benefit from hearing-aid use. The knowledge of teachers and other educators of the deaf of hearing aids could improve their professional effectiveness with the hearing-impaired school-aged population (Lass et al., 1989).

Limitations

This study was designed to investigate the hearing-aid situation in Zimbabwe. The study focussed on teachers, heads of schools, hearing-aid technologists, and a college lecturer at the United College of Education in Zimbabwe during the summer of 1993.

Some caution must be taken when interpreting the results of this study because the interview method of data collection employed in this study had certain inherent limitations, as did the Zimbabwean context:

1. Deaf pupils, who are the largest beneficiaries of hearing aids, were not interviewed due to a language barrier.
2. This study dealt with only those children who had been identified. Some or many children might have losses unknown to families and schools.
3. The training experiences and the backgrounds of respondents varied considerably, creating the possibility of a greater variance in many responses.
4. Also, because this study is a descriptive survey of institutions in Zimbabwe, the findings are directly applicable to teachers of the deaf or hearing-impaired children in that country.
5. As well, the use of the Likert scale on teachers' attitudes might not be indicative of the general level of favourableness of the teachers' attitudes throughout because teachers' attitudes might change from time to time due to factors and circumstances involved.
5. Procedures for selecting hearing aids were not investigated.
6. Because children have not been tested, there is no attempt to match the type of hearing loss to the particular hearing aid, resulting in inappropriate fitting.

Definition of Terms

Significant terms used in this study are operationally defined as follows:

Hearing impaired and ***deaf*** are used interchangeably in Zimbabwe (see Appendix M). But in North America, according to Rodda and Grove (1987), "Hearing impaired refers usually to deaf and hard of hearing people collectively." In this paper the terms hearing impaired or deaf will be used interchangeably, meaning any child who has any kind of hearing loss.

Hearing aid: According to Berg (1987), it is a miniaturized device that partially compensates for hearing loss. The aid reconfigures and amplifies sounds so that a hearing-impaired person can detect sound more fully. Bess and Humes (1990) referred to a hearing aid as "an electroacoustic device that converts the acoustic signal, such as speech sound, into an electrical signal" (p. 181).

Behind-the-ear hearing aid (BTE): An aid worn behind the ear.

In-the-ear hearing aid (ITE): A small aid usually worn by adults. It is placed in the canal of the outer ear.

Body (worn) hearing aid: An aid attached to the clothing, placed in a pocket, or carried in a harness around the chest. An external receiver attaches directly to the earmould and is driven by power supplied through a thin, flexible wire from the instrument case. Body-type hearing aids usually provide greater gain and power output than ear-level instruments (Northern & Downs, 1984). But Sanders (1993) expressed an opposite view to that expressed by Northern and Downs on ear-level instruments. He said that now ear-level hearing aids are as powerful as body aids.

Listening check for hearing aids: Using the Ling Five Sound Test of /a/ /u/ /i/ / ʃ / /sh/ /s/ (from the International Phonetic Alphabet [IPA]), Potts and Greenwood (1983) listed nine listening-check strategies (see Appendix L).

Effective use of aids: As used in this study, this refers to how deaf pupils make maximum use of their hearing aids to listen, pay attention, and learn in the classroom so as to benefit from the use of an aid, as well as how teachers handle the aids.

Attitudes: *Attitude* was defined by Thurstone (1959) as "the sum total of a man's inclinations, and feelings, prejudice or bias, preconceived notions, ideas, fears, threats and convictions about any specific topic" (p. 216). Later, Sherif and Sherif (1967) also defined attitude as an individual's set of categories for evaluating a stimulus domain which he/she has established as he/she learns about that domain in interaction with other persons and which relate him/her to various subsets within the domain with varying degrees of positive or negative effect.

Integrated unit/class: *Integrated unit/class* was defined as one in which a hearing-impaired/deaf child was placed with his normal peers or deaf peers into a regular class or special class and receives additional instruction or assistance in required areas. A child was regarded as being placed in an integrated unit if he/she spent more than half of each school day in that class.

Knowledge: In the context of this research, *knowledge* is that functional know-how or know-what shown by teachers when they deal with children wearing hearing aids. Stein (1975) stated that "knowledge is acquaintance with facts, truth or principles or familiarity with a particular subject or branch of learning" (p. 742), in this case, on the functions of the hearing aid.

Organization of the Thesis

The thesis is organized into five chapters. The first chapter provides the problem, the purpose of the study, assumptions of the study, research questions, significance of the study, limitations, and the definition of terms. Related literature, with some background of how hearing aids came into Zimbabwe, some history of the five established Schools for the Deaf, functions of hearing aids, types of hearing aids, selection of hearing aids, teachers' knowledge of hearing aids, hearing-aid fitting (versus counselling), hearing-aid management, and reviews of recent studies on the use of hearings aids, are presented theoretically in Chapter 2. Chapter 3 describes the research design and methodology used in this study and the instruments employed to collect and analyse the data. Chapter 4 deals with data analysis and results. Chapter 5 describes the recommendations and the conclusions of the thesis and the implications of the findings for teachers and for further research in the Zimbabwean context.

Chapter 2

Related Literature

The literature which is pertinent to the understanding of this research can be categorized under the following headings: Background of How Hearing Aids Came Into the Limelight, Functions of Hearing Aids, Types of Hearing Aids, Selection of Hearing Aids (Versus Donation), Teachers' Knowledge of Hearing Aids, Hearing-Aid Fitting (Versus Counselling), Hearing-Aid Management, Hearing-Aid Use and Care, and Review of Recent Studies on the Use of Hearing Aids in Schools.

In developing countries, Zimbabwe in particular, the study of human hearing lagged far behind the study of vision until late in the 1970s. One explanation for the lack of attention to this field is that formerly in Zimbabwe little or nothing could be done to improve hearing. But after the 1981 National Disability Survey, a sudden rise of scientific and general interest in hearing defects was evident. Everyone, including the education authorities (especially the government, since most of the Schools for the Deaf were under missionaries) felt that remedial measures could be found to address serious defects in speech and personality accompanying childhood hearing loss. Schools and charitable agencies started receiving hearing aids from all over the world—though there was little knowledge about how to select, maintain, and use the instrument for individual children's maximum benefit.

Background of How Hearing Aids Came Into the Limelight

Zimbabwe is a developing country in Southern Africa. It is also joining the technological world of hearing aids, cochlear implants, impedance audiometers, and auditory brain responses, though in a small way. Many of the hearing aids in Zimbabwean schools are donations from developed countries such as Holland, Sweden, Britain, and the United States of America. These hearing-aid donations were prompted by the National Disability Survey which was carried out in the country in

1981, which was also the International Year of the Disabled. The National Disability Survey estimated the number of hearing impaired in Zimbabwe at 8,000 (a prevalence similar to that found in Europe estimated at 1 per 1,000). Assuming a relatively even distribution of hearing impairment across the age range, there should be a minimum of 4,000 deaf children under the age of 15 in Zimbabwe.

Hearing aids were introduced in the country in the early 1980s. These hearing aids, when they were donated, did not come with specifications of how powerful they were or for whom they would be most suitable. People in Zimbabwe were not well qualified to fit these hearing aids on children, so aids often were fitted on children without matching them to children's hearing losses. There was also very little screening done in schools because there were no screening audiometers. These facts point to problems that schools have with hearing aids. Some of these donated hearing aids found their way to the shelves; others are in use. The present researcher hoped to uncover information about what was actually happening.

In Zimbabwean Schools for the Deaf and integrated units, all children (100%) wear hearing aids. These aids are school property in 75% of the schools, which means that the children do not own hearing aids, but they just wear them on the school grounds and in classrooms during school hours. When they go home or to the hostels in the case of residential schools, they take off the aids. In one school the children have two aids: one is school property, and the other one is theirs. This school is in an affluent society. Parents have bought hearing aids for their children; thus, the children at this school wear them all the time.

The National Disability Survey (1981) conveyed that most of the deaf children under the age of 15 were in schools. That finding, however, was inaccurate, as shown in Table 1. The table maps a short history of the five Schools for the Deaf, showing that only a handful of deaf children are in schools. Presumably, most or all of them wear donated hearing aids. For that estimated number of hearing-impaired pupils, there are five established residential Schools for the Deaf (catering for the deaf) and over 10 integrated units in the country. The integrated units are classes for the deaf accommodated in an ordinary school. In these schools deaf pupils are integrated into ordinary classrooms for some, but not all, subjects.

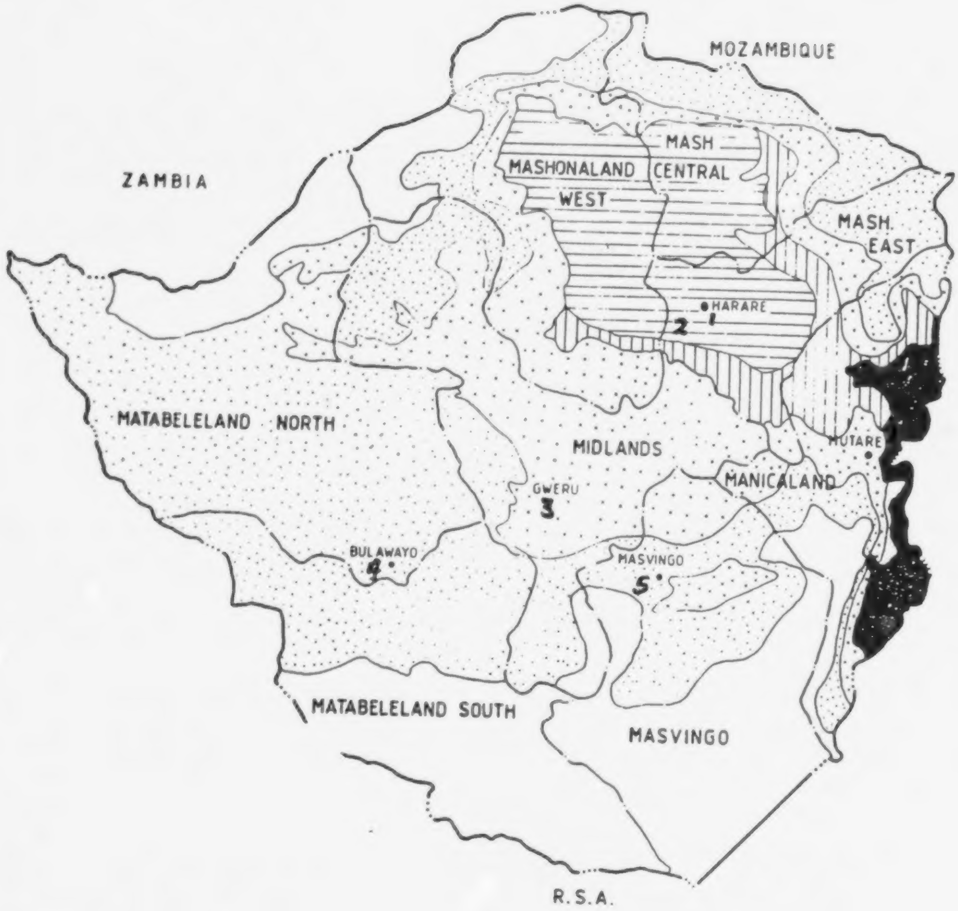
These established schools are Emerald Hill School for the Deaf (Harare), St. Giles Rehabilitation Centre and School (Harare), Jairos Jiri Naran Centre (Gweru), King George VI Rehabilitation Centre and School (Bulawayo), and Henry Murray School for the Deaf (Morgenster in Masvingo). (See their locations on the map of Zimbabwe, Figure 1.)

Table 1

Short History of the Five Schools for the Deaf and Present Situation (1986)

Name of institution	Date estab.	Type of disability	Responsible authority	Enrolment	Total no. of teachers	Teachers qualified to teach H/I
Emerald Hill School for the Deaf (formerly Loreto), Harare	1947	H/i pupils only	Dominican Sisters R. Catholic	200	30	12
Henry Murray School for the Deaf (Morgenster), Masvingo	1947	H/i pupils only	Dutch Reformed (African Ref.) Church	300	45	10
Jairos Jiri Naran Centre, Gweru	1968	H/i pupils only	Charitable organization	300	46	20
St. Giles School for the Deaf & Rehab. Centre, Harare	1956	Centre of different h/caps & h/i	Charitable organization; now gov't. controlled	66	8	4
King George VI School & Rehab. Centre, Bulawayo	1953	Centre of different h/caps & h/i	Charitable organization; now gov't. controlled	70	10	6

N.B. Since 1987 quite a number of integrated units have been set up in different established, ordinary primary schools throughout the country. It is estimated that there are almost 96 hearing-impaired pupils in these integrated units.


MOZAMBIQUE
ZAMBIA
MASH CENTRAL
MASHONALAND WEST
MASH. EAST
HARARE
2
1
MATABELELAND NORTH
MIDLANDS
MUTARE
MANICALAND
GWERU
3
BULAWAYO
4
MASVINGO
5
MATABELELAND SOUTH
MASVINGO
R.S.A.

Key

1. Emerald Hill School for the Deaf
2. St. Giles
3. Jairos Jiri Naran Centre
4. KGVI School for the Deaf
5. Morgenster School for the Deaf

Figure 1. Locations of Schools for the Deaf in Zimbabwe.

Functions of Hearing Aids

According to Bess and Humes (1990), the hearing aid, for example, is referred to as "an electroacoustic device" (p. 181). The hearing aid converts the acoustic signal, such as a speech sound, into an electrical signal. The device then manipulates the electrical signal in some way, converts the electrical signal back into an acoustic one, and then delivers it to the ear canal of the wearer.

Bess and Humes (1990) also emphasized the rehabilitative function of the hearing aid: "The hearing aid is considered to be the most rehabilitative device designed to facilitate communication development" (p. 180). Berg (1987) explained that the function of a hearing aid is to compensate partially for hearing loss. He went on to say: "The aid reconfigures and amplifies sounds, so a hearing impaired person can detect them more fully" (p. 119). Berg advised that hearing aids always be kept functioning to their maximum level in order to help children in their listening. Sandlin (1990) re-emphasized the hearing aid's functional use as "the amplification arrangement that will best maximize use of residual hearing" (p. 63).

Wayner (1990) said that "a hearing aid is a complex and delicate instrument that needs attention to ensure good operation" (p. 66). Before one puts on a hearing aid, one should give it a quick, thorough visual inspection and listening check to ensure maximum amplification. The child must learn to wear a hearing aid correctly and use it effectively. What it means is that the child has to listen attentively and be able to discriminate different sounds in different acoustic environments. He/she must be able to identify sounds, moving from listening to simple acoustic signals in quiet to complex signals in noise. Using a hearing aid effectively is a procedure for both the child and the teacher. Berger and Hagberg (1982) suggested that there should be a well-defined connection between "help from the hearing aid and patient satisfaction" (p. 77). The assumption from all these authorities is that there should be benefit from amplification from the hearing aid. Any good functional hearing aid should satisfy that amplification function.

Types of Hearing Aids

There are five basic types of hearing aids available to the hearing impaired today. Bess and Humes (1990) and Sanders (1993) have identified the five types as (a) the body aid, which is tucked somewhere in the pocket or on the belt, with one or two cords from the hearing aid running to the ears (by means of moulds and receivers); (b) the eyeglass aid, which serves a double purpose of helping the person's sight as well as hearing. It is, in fact, an ear-level hearing aid because the aid is attached to one of the eyeglass handles. This type of hearing aid is rarely used now; (c) the behind-the-ear aid (BTE), which is hooked behind the ear. This type of aid is vastly used in the world now except in some African countries—Zimbabwe, in particular; (d) the in-the-canal aid (ITC), which is a miniature aid that is fitted into a person's external auditory meatus. This is an aid used mostly by adults; and (e) the in-the-ear aid (ITE), which is worn in the same way as the ITC aid. It is also used mostly by adults whose ear canals have finished growing.

In the early 1970s the House brothers, Howard and William, made a breakthrough that has enormous significance for those persons who cannot communicate significantly with conventional hearing aids. For this relatively small group of profoundly hearing-impaired persons, help has been provided by a prosthetic device called the cochlear implant (Sanders, 1993). Sanders said, however, that "the cochlear implant, in its present state of evolution, is not intended to replace a conventional hearing aid" (p. 205).

In Africa the body aids are the ones most often used. In Zimbabwe, in particular, the BTE or ITE hearing aids are used very rarely. Due to less or little technological advancement, almost all children who use hearing aids use the body-worn aids. Advantages of these body aids have been appreciated for quite some time. The fact is that this type of aid was donated to Zimbabwean schools, so there is no choice and very little selection. One girl at St. Giles Rehabilitation and School for the Deaf uses a cochlear implant. The implementation of the use of cochlear implants is still far from being realised. (See Appendix H for the types of hearing aids.)

Selection of Hearing Aids (Versus Donation)

An old adage says, "Beggars cannot be choosers." This is very true for the Zimbabwean situation. Bess and Humes (1990), Martin (1987), Berg (1987), and Sanders (1993) all spoke of the need for early identification of hearing impairment in order to select an appropriate hearing aid for the child. However, in Zimbabwe the loss is identified very late, and children start school without amplification.

In the first place, Zimbabwean children with hearing impairment are not exposed to audiological services before they come to school. It is only at their special schools that children meet teachers who have some knowledge of audiological equipment. These very teachers take the role of audiologist and screen children for hearing aids. Therefore, what Wayner (1990), Bess and Humes (1990), and Sanders (1993) saw as the appropriate and ideal situation, that "various members of the hearing aid delivery system" should take part in instructing the hearing-aid wearer in the use of the hearing aid, is not feasible. Martin (1987) spoke of shared responsibilities between the otologist, audiologist, and hearing-aid dealer; that is not the case in Zimbabwe. The teacher is most important. He/she cannot help the child select the donated hearing aid. There are no conflicts as the teacher decides alone what to give the child. Skinner (1988) spoke ideally of "good communication and sharing of experiences between the audiologist and the hearing-aid dealer to enhance the maximum use of the aid by the hearing impaired person" (p. 88). In Zimbabwe this cooperation or working together of these professionals is nonexistent, which obviously points to something very important which is missing—the expertise of the professionals.

Teachers' Knowledge of Hearing Aids

In Zimbabwe there are two groups of teachers: one group has specialized in teaching the deaf since 1987 and has a knowledge of hearing aids. The other group is a group of trained teachers not specialized in teaching the deaf, but they have experience in teaching the deaf. These teachers have little formal or course-based knowledge of hearing aids although they handle the aids every day. Skinner (1988), Wayner (1990), and Sanders (1993) concurred in saying that, regarding management and habilitation of hearing-impaired children, those responsible for these programs should also think about hearing aids for children and emphasize the importance of amplification to enhance children's hearing.

Berg (1987) stressed the idea that teachers, as the field specialists, should understand acoustics and hearing and their effects on listening and skills for compensating for acoustic, hearing, and listening problems as they occur in schools. He went on further to say that teachers should be involved in hearing, speech, and listening considerations; room acoustics; and hearing aids. Knowledge of these aspects will enhance their teaching and auditory habilitation techniques.

Hearing-Aid Fitting (Versus Counselling)

The selection of suitable hearing aids is a primary goal when developing comprehensive habilitation programs for hearing-impaired children (Bess & Humes, 1990; Jerger, 1984; Moeller, 1988; Sanders, 1993; Skinner, 1988). There are problems in the selection and fitting of hearing aids, and these problems are quite difficult to resolve. Jerger confirmed that "many children who would benefit from wearable amplification apparently are not wearing hearing aids" (p. 48). This very statement was supported by Wayner (1990). According to two major surveys (Karchmer & Kirwin, 1977; Shepard, Gorga, Davis, & Stelmachowicz, 1981), "An appalling number of children having mild hearing losses and a substantial number with profound impairments are not using amplification" (p. 33). From my personal view, this is the situation in Zimbabwe, where very few people have knowledge of the fitting of hearing aids so as to help children benefit from their use. Suitable, well-selected aids will obviously provide adequate amplification to children.

For hearing-impaired children to benefit from the use of hearing aids, children have to be tested, hearing aids have to be properly fitted, and children have to be properly counselled. This is a very ideal rehabilitative goal, but in Zimbabwe it is far from being realized. It can only be realized when we have trained personnel in specialist areas of audiology and hearing-aid technology.

Hearing-Aid Management

The ideal situation is that the audiologist will be responsible for most things: determining the candidacy of a child for hearing aids, selecting the most appropriate available aids, securing the most appropriate BTE earmoulds or ITE shells, fitting and adjusting the aids and moulds, counselling and training parents and the child on the use of equipment, and managing these devices. In Zimbabwe this is normally not the case. It is the teacher who is responsible, and as a result, taking cognizance of what has already been said about teachers' lack of knowledge, very little in the selection, fitting, and management of hearing aids is done. What it also means is that the MPO on children's aids may not match the tolerance level.

According to Berg (1987), "Children tend to have hearing aids that do not work optimally, unless a hearing aid management program is operational" (p. 72). He went on to say that "an informed, systematic and sustained hearing aid management program is needed in the schools" (p. 74). Pasco (1975; cited in Sandlin, 1990) said that good hearing-aid management leads to hearing-aid acceptance and beneficial use resulting in successful rehabilitative management. Teachers, parents, and hearing-impaired children should know how to manage hearing aids effectively (Berg, 1987; Jerger, 1984; Sandlin, 1990).

Hearing-Aid Use and Care

Although a hearing aid is a complex electronic device, it requires only simple care and maintenance (Bender, 1980). Due to improvements in micro-electronics, today's hearing aids are smaller, more light-weight, and technically superior to older models (Boothroyd, 1982). Many people who previously may not have been helped are finding that they can now benefit from using a hearing aid.

Professionals—teachers, in this context—working with children wearing hearing aids must learn the operations of hearing aids and how to maintain and troubleshoot them if there are any problems. They must know how and when to replace batteries and learn details of good battery usage (Hodgson, 1986). Separate investigations of hearing aids worn by hearing-impaired children in the U.S.A. (Porter, 1973; Riedner, 1978; Zink, 1972; Zink & Barz, 1979) found that about half the aids were not functioning acceptably.

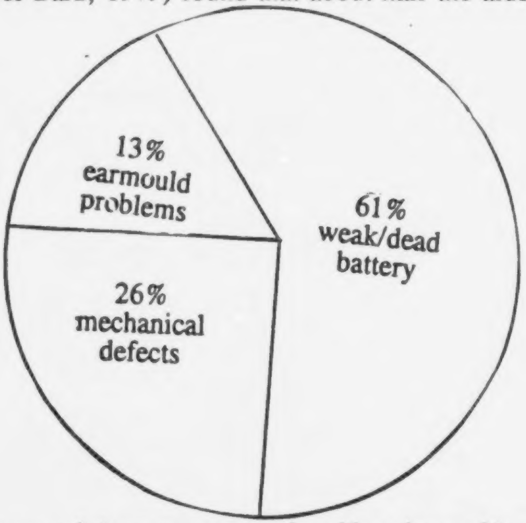


Figure 2. Summary of the percentage of malfunctions of hearing aids in the U.S. in 1979.

As a result of the aforementioned investigations, daily monitoring (a hearing-aid check) is necessary to ensure adequate amplification. Teachers must determine the source of hearing-aid malfunctions. Also, children who wear these aids must be taught some basic facts about the care and proper use of hearing aids. As part of effective hearing-aid use, Hodgson (1986) suggested that "the child (patient) must learn how to improve listening conditions and manipulate the environment for more effective communication" (p. 220). Hodgson and Matkin (1986) further suggested that teachers and children need to understand the important parts of the hearing aid. "Understanding the operation and parts of the hearing aid may change the aid from the mysterious electronic device in the mind of the user (child) to a tool which can be used efficiently to reduce the handicap of hearing loss" (Hodgson, p. 221).

Zink and Barz (1979), Hodgson and Matkin (1986), Potts and Greenwood (1983), Busenbark and Jenison (1990), and Duhamel and Yoshioka (1992) stressed that a daily listening check of hearing-aid function must occur. Hodgson and Matkin suggested the following checklist:

> 1. Check the battery voltage. The reading should be the specified voltage for the particular battery.
> 2. Turn the gain control up and down slowly. Are there any "scratchy" noises or spots where the hear aid goes dead? Is there an appropriate increase in loudness as one talks and turns up the gain control? Is speech clear within the limits of normal hearing-aid function?
> 3. Tap the case of the aid. Is the signal intermittent, suggesting loose battery contacts? With body-worn aids, move the cord back and forth, grasping it first near the attachment to the aid, then near where it fastens to the receiver. An intermittent signal means a broken cord or loose connections.
> 4. Visually inspect the aid, tubing, and earmould. Are there cracks, or is the tubing hard and brittle? Is the earmould clean and free of wax?
> 5. Listen for feedback occurring at use gain control setting. If it is present, check to be sure the earmould is seated securely or to see if there are loose connections along the sound pathway. If professional help is necessary, the audiologist can probably locate the source of acoustic feedback by using a hearing-aid stethoscope. With the aid on the patient, and feedback occurring, hold the stethoscope to the various places where sound could be leaking between the earmould and the ear, where the tubing exists from the earmould, and where it attaches to the earhook, or between the earhook and the hearing aid. (pp. 72-75)

Duhamel and Yoshioka (1992) also gave a comprehensive hearing-aid checklist, including all types of hearing aids, as well as a troubleshooting checklist (Appendix K). The comprehensive checklists were the result of sorting through a variety of user comments and complaints and checking carefully the hearing-aid performance (p. 1). They suggested that one should use a systematic approach when analysing such complaints and problems. One should start with the hearing aid itself. If there are no problems, one should look into the ear and/or retest the hearing. If no problem is found, one should investigate the listener's environment for strange noises, difficult listening situations, problems with coping strategies, and so on.

Behind-the-ear hearing aids. Check that the earhook, tubing, and earmould are free of moisture, earwax, and other debris. Check that the tubing is not twisted, brittle, or cracked. The earmould can usually be washed separately in warm, soapy water. A rubber-bulb, forced-air blower is an efficient way of drying the earmould (Duhamel & Yoshioka, 1992).

Also, the earmould should fit comfortably in the ear, not too tightly and not too loosely. Potts and Greenwood (1983) stated that "a loose earmould can cause feedback problems and reduce the available gain to the listener" (p. 156). An earmould which is too tight can gradually enlarge the ear canal (Duhamel & Yoshioka, 1992). It could be difficult to remove or insert or could cause pressure sores in the ear. In many published studies into hearing-aid use, earmoulds have been found to affect greatly the sound quality of the hearing aid and the user's overall satisfaction.

Body aids. Studies by Zink (1972), Haug and Haug (1977), and Duhamel and Yoshioka (1992) have reported that damaged cords are often the source of intermittencies, static, distortion, and poor sound quality. To troubleshoot these problems, they suggested that one has to look for pinches in the wire or breaks in the insulating covering. "Wiggle the cord gently at the hearing aid and at the external receiver to check for a loose connection" (Duhamel & Yoshioka, p. 4). They also suggested that one should gently roll the cord between the fingers over its entire length while listening to the hearing aid to check for shorts in the wiring. Further, they suggested that one should check whether the earmould snaps snugly onto the external receiver. (For the comprehensive checklist, see Appendix K.)

Factors influencing hearing-aid use. Parving, Sibele, and West (1992) in their survey on auditing hearing-aid quality in Denmark reported some important factors that result in "nonuse" of hearing aids. One factor may be technical instability of the hearing aids, resulting in annoyance and frustration when the aid does not function. In their study they indicated that using one's hands to operate the function buttons is the biggest problem.

The importance of manipulative aspects of hearing-aid management cannot be overemphasized. Apart from the user's obvious need to manipulate the aid if it is to be of value, the effectiveness and cost of the fitter's delivery of the aid is highly dependent upon the ease of manipulation and the speed with which the hearing-aid user learns the necessary skills.

Though Parving et al. (1992) mentioned the manipulative aspects as enhancing hearing-aid use with hearing-impaired children, a study carried out earlier by Chung and Stephens (1986) stated that audiological, psychological, and social factors affect hearing-aid use. These include:

1. Severity of hearing loss: The general conclusion is that the more severe the hearing loss for speech, the more the patient will use the hearing aid (Brooks, 1981; Stephens, 1977). However, some studies by Jerger and Hayes (1976) and Kapteyn (1977) showed no clear relationship.

2. Type of hearing loss: Patients with conductive disorders tend to show greater hearing-aid use than those with sensori-neural hearing loss (Haskins & Hardy, 1960; Stephens, 1977). But other studies by Jordan, Greisen, and Bentzen (1967) and

Bentzen, Frost, and Skaftason (1969) found that the nature of hearing loss did not significantly affect hearing-aid use.

3. Age of patient: In nine published studies into hearing-aid use, no relationship was found between the amount of use and the age of the users. In five studies, a decline in hearing-aid use was found with increasing age (Brooks, 1981; Stephens, 1977).

4. Sex of patient: Kapteyn (1977) showed that the satisfaction with hearing aids was a little higher in men than it was in women for matched-mean hearing loss and discrimination, but the mean age of his female subpopulation was about five years higher than it was of the men. Ewertsen (1974) indicated that women tended to use their hearing aids more than men did. Brooks (1981) found no significant difference between the sexes and hearing-aid use.

5. Provision of counselling (after care): In five published studies into hearing-aid use, a significantly greater use was observed in subjects receiving counselling than in those who did not, especially in elderly subjects (Brooks, 1981; Brooks & Bulmer, 1981; Kopra, 1976; Surr, Schuchman, & Montgomery, 1978).

6. Psychosocial problems: There is little point in proceeding with the hearing-aid selection process until the hearing-impaired individual and family are positively motivated towards its use (Freedman & Doob, 1968; Goffman, 1963), especially when, according to Bentzen (1980), wearing two hearing aids implies "double deafness."

Other studies by Brooks (1989) revealed that attitudes also have a greater effect on hearing-aid use. In his study, entitled *The Effect of Attitudes on Benefit Obtained From Hearing Aids*, he stated that it is difficult to measure accurately the benefits of hearing-aid use. Poor use of hearing aids may be the result of many factors. He went on to say that modern instruments are technically adequate for the needs of most candidates, provided that they are correctly fitted. "The reasons for *disuse* and *underuse* nowadays appear to be more related to the attitude of the potential user" (p. 3). Hearing aids are obtained or provided with the primary objective of diminishing the handicapping effect of hearing impairment. The benefit obtained from amplification by an individual can be assessed in many different ways.

Supporting studies by Markides (1989) over a period of 10 years (1977-1987), entitled *The Use of Individual Hearing Aids by Hearing Impaired Children: A Long-Term Survey, 1977-1987*, focused on how children used hearing aids with the help of teachers. He reported that the examination covered those parts of a hearing aid which a teacher of the deaf could reasonably be expected to check, without the use of complicated equipment, to ensure that it was functioning properly. Thirty-nine percent of these children wore body-worn aids, and the rest (61%) used ear-level aids. His study revealed that there was a marked degradation in the use of both body-worn aids and ear-level aids with increasing age of the children, and that this was true for both boys and girls. He went on to stress that "hearing aids are effective only when they are consistently and properly used" (p. 165). Martin and Lodge's (1969; cited in Markides) study reported that in England an average of 50% of hearing-impaired children in Schools for the Deaf and special units for partially hearing-impaired children (PHU) were not making proper use of hearing aids.

Review of Recent Studies on the Use of Hearing Aids in Schools

Creating effective, practical school monitoring systems that are responsive to the diverse needs of children wearing hearing aids has been a continuing challenge in the education of deaf or hearing-impaired children. Researchers such as Zink (1972) in the U.S.A. reported on the studies to evaluate and monitor electroacoustic performance characteristics of hearing aids worn by children. His areas of investigation included studies of repaired hearing aids, instruments in use, new hearing aids, and donated hearing aids. Of the donated hearing aids, Zink found that most (92%) were found to deviate markedly from the manufacturer's specifications. Teachers were found to have limited background information regarding care and operation of hearing aids.

Others studies by Porter (1973), who researched the use of hearing aids in a residential school—Kansas School for the Deaf (K.S.D.), reported that some deaf children did not use their aids effectively despite their being malfunctioning. In his study, 45% of the aids evaluated had feedback problems, defective controls, cracked receivers, distorting or noisy amplifiers, or other defects. For effective hearing-aid use, Porter suggested that the teachers increase awareness on hearing-aid functions and improve monitoring strategies.

According to Hanners and Sitton (1974), "Children's hearing aids are subject to a number of malfunctions—dead batteries, broken cords, poorly fitting earmoulds—which may result in minimal amplification in the classroom, depriving the child of a full day's learning" (p. 530). Hanners and Sitton (1974) suggested that a daily hearing-aid monitor programme requiring only 90 seconds per child for a hearing-aid check can reduce hearing-aid malfunctions and ensure that each child enters class with a working hearing aid. According to their research, about 40% of the hearing aids in a given classroom on a given day could be expected to be nonfunctional. The implication that hearing aids are poorly monitored—even in otherwise excellent programmes—is significant, for a hearing-impaired child whose primary amplification is not functional loses that day's learning (Hanners & Sitton).

Ross and Calvert (1976), in their *Guidelines for Audiology Programmes*, reported evidence which clearly demonstrates that, at any one time, at least half the children's hearing aids can be malfunctioning; that many of the children who possess hearing aids do not routinely wear them; and that children who can potentially benefit from amplified sound do not even own a hearing aid. These problems, they reported, "are understandable in view of unqualified teachers" (p. 347). They suggest improvements in the poor acoustic conditions existing in classroom environments which limit the effectiveness of appropriate amplification.

Rawlings and Trybus (1978) investigated *Personnel, Facilities, and Services Available in Schools and Classes for Hearing Impaired Children in the United States*. The findings of their investigations pointed to the need for qualified teachers in Schools for the Deaf, knowledgeable teachers who could help check children's hearing aids to determine whether they are functioning properly and the availability of "loaner" aids when the child's aid is not functioning. Also in their report they indicated that "only half the programs, overall, provide 'loaner' aids when the child's aid is not functioning, and nearly one out of five programs report that they do not ever check the condition of children's hearing aids" (p. 111). The most frequently reported "other interval" for checking of hearing aids was "on demand" or "upon request," or similar descriptions. They also reported the unavailability of counselling personnel and procedures for assuring hearing aids are usable during class hours.

Meanwhile, however, wearable hearing aids have remained a big challenge to educators of the deaf, especially in the minimisation of their malfunction. Studies have revealed that this goal is beset with barriers, and the actual use of hearing aids in the schools shows a high failure-to-success ratio (Brooks, 1968; Coleman, 1972; Diefendorf, 1974; Gaeth & Lounsbury, 1966; Hanners & Sitton, 1974; Porter, 1973; Zink, 1972). Kemker, McConnell, Logan, and Green's (1979) investigation, *Children's Hearing Aids in a School Environment*, reported that a programme of weekly audiologic monitoring of hearing aids in the classroom and daily inspection of the hearing aids by teachers and teacher aides may drastically reduce the number of hearing-aid malfunctions. Their study confirmed earlier studies by Coleman, Zink, and Porter. Kemker et al. went further to suggest that teachers and teacher aides, as active participants, "become more aware of the crucial importance of mechanical defects which interfere with children's classroom performance" (p. 52).

"It is unrealistic to propose that hearing aid malfunction can be completely eliminated" (Potts & Greenwood, 1983, p. 161). These authors investigated hearing-aid monitoring in schools. In their report they indicated that, despite ongoing programmes of hearing-aid monitoring, aids still malfunction. In effect, this means that, even with routine monitoring, hearing aids provide inadequate amplification. However, Potts and Greenwood suggested that, though "effective monitoring and use of hearing aids is a difficult goal to obtain, teachers have to consistently stick to the system and monitor children's aids for full amplification" (p. 162). Optimum hearing-aid functioning is a primary goal when seeking appropriate amplification. They concluded, however, that "the interaction between child, hearing loss and hearing aid must not be overlooked" (p. 162). (See Appendix L.)

Although previous studies focused specifically on hearing-aid malfunctions and monitoring, the study by Cox, Cooper, and McDade (1989) focused on teachers' perceptions of students who wear hearing aids. In effect, this research investigated "the hearing-aid effect" on adolescent girls and found that, on factors of achievement, such an effect does in fact exist. Also investigated was whether the type of hearing aid affected observer ratings. Findings in the same research suggested that educators are becoming increasingly sophisticated in their attitudes toward hearing-aid users. Cox et al. concluded that more research is needed in this area of attitudes to validate their findings.

Woodford (1987) carried out a study with speech-language pathologists in Virginia. His focus was on knowledge and skills regarding hearing aids. He used a written and practical examination on hearing aids. Results from Woodford's study indicate that "the majority of his sample of 102 speech-language pathologists lacked basic knowledge and skills necessary to provide help with amplification to aided hearing-impaired students" (p. 312). In his conclusion Woodford suggested that training in assessment and maintenance of hearing aids should be given priority in university or college programmes.

Following the Woodford (1987) study, Lass, Tecca, and Woodford (1987) carried out a study entitled *Teachers' Knowledge of, Exposure to, and Attitudes Towards Hearing Aids and Hearing Aid Wearers.* A 20-item questionnaire was used by Lass and his co-researchers. The questionnaire contained questions on respondents' knowledge of various aspects of hearing aids and their attitudes towards hearing aids and hearing-aid wearers. The findings of their study indicate "some deficiencies in teachers' knowledge of, exposure to and attitudes toward hearing aids and hearing aid wearers" (p. 88). In their conclusion they suggested that teachers "need more information on and exposure to hearing aids and hearing aid wearers in preservice academic training programmes as well as in continuing education programmes for teachers" (p. 89). They went on to say:

> These programmes should provide teachers with a heightened awareness and understanding of hearing aids and hearing aid wearers as well as a positive attitude toward them that will increase the efficiency and effectiveness of their educational services to hearing impaired children and thereby facilitate their communication and learning processes in the schools. (p. 90)

The main concern of Smedley and Palpinger's (1988) study, *The Nonfunctioning Hearing Aid: A Case of Double Jeopardy*, was hearing-aid selection and the amount of attenuation caused by a nonfunctioning hearing aid. These authors reported that "a hearing-impaired child's auditory deficit is increased when wearing a non-functioning or dead hearing aid" (p. 81). In their study they indicated that "a child wearing a non-functioning hearing aid is merely failing to receive the amplification benefit the aid is designed to provide" (p. 82). The effects of wearing a nonfunctioning hearing aid extend beyond the loss of amplification. In reality, the child may be a victim of a form of "double jeopardy." In their conclusion Smedley and Palpinger stated that "the unattended non-functioning hearing aid does more than simply fail to provide benefit—it compounds communication and educational difficulties for the hearing impaired child beyond the unaided condition" (p. 83). To avoid "double jeopardy," they suggest careful monitoring of a child's hearing aid.

Further studies by Busenbark and Jenison (1990) included *Assessing Hearing Aid Function by Listening Check* (see Appendix L). Listening checks can identify mechanical breakdowns; however, electroacoustic function may require more objective evaluation procedures. For children to use their residual hearing maximally in aural rehabilitation programmes, the most crucial element of the programme is proper fitting and maintenance of hearing aids (Berg, 1976; Bess & McConnell, 1981; Ling & Ling, 1978; Ross & Giolas, 1978). Results of the studies by Busenbark and Jenison indicate that "accurate identification of hearing aid malfunctions by classroom personnel is possible, but unlikely" (p. 267). They suggested in their conclusion that teachers in programmes for hearing-impaired children should judge the performance status of the hearing aids in their classrooms. Stress, in their opinion, was placed on obvious mechanical breakdowns (batteries, cords, etc.) that could be identified through daily listening checks.

Summary

This chapter has provided some important issues which are relevant to this study, especially that "hearing aids are the most important resource available for the habilitation of hearing impaired children" (Musket, 1988, p. 212). Teachers' knowledge of hearing aids and their attitudes toward those children who wear hearing aids are important and should be positive. Equally important is the fact that hearing aids should be well maintained, and there should be a policy of monitoring the effective use of hearing aids. Review of research on hearing aids point to the fact that appropriate training should be made available and incorporated into teacher-training or inservice programmes.

Chapter 3

Research Design and Methodology

In order to investigate the use of hearing aids in Zimbabwean Schools for the Deaf and integrated units, a questionnaire was designed for 89 teachers, and 19 interviews were carried out with heads of established Schools for the Deaf, teachers in these schools, hearing-aid technologists, and one principal lecturer from the United College of Education. Interviews were audiotaped and transcribed (see Appendix A for the questionnaire).

Sample Procedure

The sample for this study consisted of 108 participants, mostly teachers and five heads of five residential Schools for the Deaf and two integrated units around Bulawayo. The two integrated units were chosen for their convenience to the researcher. The sample population for this research was not chosen by the researcher. The researcher wrote a letter to the Ministry of Education and Culture to request permission to collect data in Schools for the Deaf and the two integrated units. The Ministry of Education and Culture notified the schools concerned through regional directors. The heads of the schools then requested volunteers from among their teachers for the interviews.

One hundred percent response was obtained from the 108 participants surveyed and interviewed. It is rated 100% because there were no absentees among those who volunteered to be interviewed and because of the maximum rate of return of the questionnaires.

Method of Data Collection

Letters were written to the Zimbabwe Canada General Training Facility, which is a sponsoring body, for permission to conduct this study and for air tickets to carry out the study in Zimbabwe (see Appendix I). Other letters were written to the Principal of the United College of Education, which represents the researcher, and to the Secretary for the Ministry of Education and Culture to grant permission to work in the schools which are under his ministry. Once permission to conduct the study was received (see Appendix B), four more letters were sent to the Deputy Regional Directors, under whom schools where the research was to take place were located. The Deputy Regional Directors notified the concerned schools directly about the researcher's timetable and schedule of visits (see Appendix C). Copies of research questionnaires and interview questions were sent to each individual Deputy Regional Director.

Questionnaires and interview questions were not sent to the schools in advance, however; the researcher took them to each school to ensure maximum return.

Description of the Questionnaire and Its Analysis

The questionnaire constructed obtained demographic information on the respondents' gender, grades taught, years of professional experience, certification status, and the highest qualification attained. The questionnaire also obtained the respondents' knowledge of various aspects of hearing aids and attitudes towards hearing aids and hearing-aid wearers. Multiple-choice and true-false questions were employed to assess the respondents' knowledge on hearing aids, whereas agreement-disagreement judgements applied to statements on hearing aids and hearing-aid wearers were used to evaluate attitudes.

Most of the questionnaire's content came from studies reported by Bebout (1985), Bess and McConnell (1981), Hull (1977), Lass et al. (1989), Mahon (1985), Ross (1975), and Schow and Nerbonne (1980). The knowledge questions (five) were taken from Lass et al. because they were relevant to what was to be investigated in the current research. The attitude questions for the questionnaire were chosen from Woodford, Tecca, and Lass (1987). The 10 questions taken describe exactly what was sought by this current study (see Appendix A).

According to Miller (1970), the questionnaire "permits wide coverage at minimum expense, wider geographical contact, larger and possibly more representative sample, more convenient answers and a sense of privacy to the respondent" (pp. 76-77). Also, the size of the sample itself is another factor that is determined to a significant extent by the data-gathering technique; if interviews are to be used, the sample usually must be small; if a questionnaire is used, then it can be many times larger.

The questionnaire also has the advantage that it is impersonal and anonymous. Some respondents may be prepared to give on an unsigned questionnaire form information that they would not be willing to divulge in a face-to-face interview; hence the questionnaire is able to research subjects that may not be able to be investigated using other techniques. Because the respondents know that they cannot be identified, they may be prepared to answer questions that they would not answer in other situations.

Another benefit of the questionnaire technique, particularly if it contains mainly "closed" questions, is that responses are easy to categorize because all responses occur within a preplanned range. Further, Fox (1969) pointed out that it is possible, using a questionnaire, to standardize the instructions to which the participants are asked to respond, because they are established as part of the questionnaire. Thus all respondents are responding to the same stimuli.

However, some researchers—Hillway (1969, pp. 34-35), for example—suggested a number of problems inherent in the use of questionnaires. These include:

1. It is difficult to avoid phrasing questions which indicate the personal preferences or bias of the researcher. This is evidenced by questions 1-7, where the researcher wanted specific information on what causes the hearing aid to malfunction.

2. Weaknesses in the design of questionnaires can cause respondents to be careless in their answers or to answer incorrectly because they cannot follow complex or ambiguous instructions.

3. Personal bias on the part of the respondents may cause them to misinterpret or misread instructions or questions.

4. Because frequently the range of responses is limited, the respondent may be antagonized because he/she would have liked to give different information about his/her own experiences or else he/she does not fit into the discrete categories given. The true-false questions fell into this category. One way around this is to use open questions, but then the problems of analysing data and the amount of time required to respond become significant.

5. It is difficult to phrase questions and responses that will fit the experience of all people in a large sample; unforeseen complications may arise to make the form difficult for any one person to complete.

6. The researcher using a questionnaire is limited in his interaction with the subjects to the actual questionnaire, which is often his/her only link with the subject. The researcher cannot follow up statements made by the subject that appear to contradict earlier statements, or request clarification about a response, as can be done in an interview. He/she must accept whatever has been written without further clarification.

7. Length is another problem. To be attractive to a respondent, the questionnaire needs to be short and simple; to be beneficial to the researcher, it needs to yield useful information.

Rummel (1964) stated:

> However, if it seems necessary to have a long questionnaire to secure adequate information upon which to base valid conclusions, it should be developed to the length needed even though the percentage of returns is likely to be small. . . . The length of a questionnaire should be dependent *entirely* upon the extensiveness of the data required and should not be controlled by the expected number of returns. (pp. 128-129)

Good (1972) suggested that a further disadvantage of both the questionnaire and the interview techniques was that "they intrude as a foreign element into the social setting they seek to describe and that they create as well as measure attitude" (pp. 226-227).

Nevertheless, despite the problems discussed, the questionnaire continues to be used extensively as a data-gathering instrument. In this study it was used so that a countrywide sample of teachers in Schools for the Deaf and integrated units could be included, and for reasons of simplicity of analysis of results. In this study there was no problem of nonreturn of questionnaires, although some items were left unscored.

For the analysis of the questionnaire, the researcher read through each item and scored them accordingly. In the first section, which was demographics, the respondents were categorized according to gender, grade taught, and experience. In the second part, which sought teachers' specific knowledge on hearing aids, each response was given a mark out of seven because there were seven items to answer. In the third section of the questionnaire, which sought the teachers' general knowledge of hearing aids, the same procedure of giving a mark was followed, but this time the score was out of 9.

Description of Informant Interviews and Analysis

Bogdan and Biklen (1992) stated: "The interview is best to gather descriptive data in the subject's own words, so that the researcher can develop insight on how subjects interpret some piece of the world" (p. 96).

The purpose of the teachers' interviews in this study was to find out their perspectives regarding issues related to hearing-aid use. Interview questions with teachers centred on their experiences with hearing-impaired children, what grades they had taught so far, what benefits children derive from wearing hearing aids, their operational knowledge of hearing aids, and whether they had problems with hearing aids.

The interview questions with heads and deputy heads of schools enabled me to elicit information on where they store hearing aids, whether hearing-impaired children benefit from wearing hearing aids, how they rated their teachers' knowledge of hearing aids, whether they had any problems with hearing aids, and what solutions to the problems they might be able to suggest.

With the hearing-aid technologists, the interview questions focussed on their background; on whether children benefit from wearing hearing aids; whether they are practising what they trained for; what problems they encounter with teachers, administrators, and the hearing aids themselves; and what they do about malfunctioning hearing aids.

The interviews with the principal lecturer from U.C.E. centred on his opinions on the hearing-aid situation in Zimbabwean schools, whether the teachers are practising what they trained for, whether there is any professional support once teachers leave the college, whether improvements can be made to the course content at U.C.E., and the issues of benefits of hearing-aid use to children.

All the interviews were dialogical in nature, with the interviewees speaking of their experiences in the institutions for the Deaf and integrated units. Every attempt was made to use open-ended questions as much as possible. An audiotape recorder was used during the interviews, which were later transcribed for thematic analysis.

All interviews were carried out at the most convenient places—at the individual schools. Each school was allotted a day. The researcher made arrangements before visiting the school to minimise disruptions during the interview sessions. There was no predetermined time allocated for each interview session; however, on the average, the duration of the interviews varied from 35 to 60 minutes.

The interview-guide questions for the sessions for heads and deputy heads of schools, teachers, hearing-aid technologists, and the college lecturer are in Appendices D, E, F, and G, respectively. All the people interviewed were pleasant and most cooperative throughout the interview sessions, and they made every effort to answer the questions fully and often did not hesitate to ask for clarification when questions were not understood or appeared vague.

For the analysis of the interviews, 320 pages of interviews were transcribed word for word. During the process of analysis, validity checks were made with both my supervisor and some friends, who read interview samples and verified the labels and categories.

Chapter 4

Data Analysis, Results, and Discussions

Hearing aids present a considerable challenge to teachers, and as a result their misuse and abuse have a significant impact on children who are hearing impaired. The majority of identified hearing-impaired children in schools in Zimbabwe wear hearing aids, so teachers' knowledge of hearing aids and their attitudes towards children who wear hearing aids are of paramount importance if effective gain is to be realised. Studies in the U.S. and other countries concerned with the condition of hearing aids worn by hearing-impaired children in schools have found an unacceptably high proportion of these instruments (usually 50% or more) to be malfunctioning (Hanners & Sitton, 1974; Mynders, 1981; Potts & Greenwood, 1983; Rawlings & Trybus, 1978; Zink, 1972).

In this research, 89 teachers responded to the demographic questionnaire, which also included one section on knowledge of hearing aids and another section on the attitudes towards hearing aids and hearing-aid wearers. Nineteen interviews were carried out with five teachers, six heads, five deputy heads, two hearing-aid technologists, and one principal lecturer from the United College of Education, Special Education Department. The teachers, heads, deputy heads, and hearing-aid technologists who were involved in the interviews did not answer the questionnaire. All the interviewees were experienced people in established schools and the college.

For discussion purposes, results are provided according to three sections: demographics; knowledge, which is divided into knowledge and attitudinal aspects, which is a forced Likert scale with agreement and disagreement aspects; and interviews.

The Demographic Data

As already mentioned, the demographic data came from 89 teachers who completed the questionnaires. The data sought to find out what kind of teachers taught in these schools and at what levels they were teaching. Also, the data show at what levels different teacher genders are concentrated.

Table 2 provides information on the teachers themselves. As the data show, more females are teaching in the lower grades. In Grades 1-3, 39 (93%) out of a total of 42 teachers are female, and only 3 are males (7%). This is probably the result of a historical trend in Zimbabwe's (then Southern Rhodesia's) training colleges in the late 1960s. Quite a number of training colleges for teachers focussed their curriculum on infant education; thus PTL and T/4, specifically, were meant for these lower grades. Another fact is that for the two levels, teachers went for training after Standard Six or Form Two (see Appendix N).

In the junior mid grades (Grades 4-6), the trend still shows more females—23 (67%); 11 (33%) are males. However, sometimes in the mid grades the numbers are equal. The trend is reversed in Grade 7, where more males are found teaching. The table shows that nine males (69%) and four females (31%) taught at this level. The reason that more males teach at the Grade 7 level is that Grade 7 is an examination class and more challenging, so males take the challenge, although a few females do as well.

The certification level also shows that those teaching Grade 7 were from levels 4 to 10. Level 4 is T/3, which recruits students for training after Ordinary Level ('O' level)—four years of secondary education. They are considered well qualified to teach in high grades, even in the junior high school. But one could also find one or two PTL-certificated teachers in Grade 7. These teachers are well experienced and may have been teaching that examination class for years.

Table 2

Descriptive Relationships Between Grades Taught, Type of Certification, Years Teaching Experience, and Gender

	Type of certification										Years teaching			Gender	
Grades	1	2	3	4	5	6	7	8	9	10	1-7	8-16	17-21	M	F
1 - 3 (n=42)	8	0	3	6	8	0	0	1	8	7	10	19	13	3	39
4 - 6 (n=34)	0	0	0	7	12	2	1	0	8	3	17	14	3	11	23
7 (n=13)	1	0	0	1	4	1	1	0	3	2	3	8	2	9	4

Certification key:
1 = PTL
2 = PTH
3 = T/4
4 = T/3
5 = U.C.E.
6 = Diploma
7 = B.Ed.
8 = M.Ed.
9 = CE/Other
10 = Dual, i.e., T/3 + U.C.E.
T/3 + Diploma
PTL + Diploma

Overall, in the Schools for the Deaf and integrated units where data were collected, there are more female teachers (66; 74%) than male teachers (23; 26%). These demographic data can be considered important for the following reasons. The existing literature suggested that teacher demographics may or may not influence the success of hearing-aid use in schools. Harvey and Green (1984) cited studies suggesting that variables such as class size, the size of the school, the age of the teacher, the teacher's years of experience, or the teacher's area of specialisation have no significant effect on attitudes towards the use of hearing aids. This was consistent with the findings of Lass et al. (1987) that there were no significant differences in teacher responses towards the use of hearing aids based on teacher training, teaching experience, and grade level taught.

Conversely, in Harvey and Green's (1984) research, older teachers, in terms of experience, felt more prepared to deal with children with hearing aids, reflecting their years of experience and, consequently, their level of confidence in teaching children wearing hearing aids. Some of the literature suggested that the gender of the teacher had no effect on attitude towards hearing aids (Foley, 1978; Hughes, 1978), while another study by Higgs (1975) found that female teachers were more positive. In a more recent study, Frost and Common (1989) found that gender was significantly related to attitude, with male teachers being more accepting of children with hearing aids in the classroom than were female teachers. For purposes of this study, factors such as gender and age were not investigated because this was not the most important focus.

Knowledge of Hearing Aids

Questionnaire questions on the knowledge of hearing aids were divided into two categories and are shown in Tables 3 and 4. Questions in Table 3 concerned specific information about the hearing aid itself, whereas questions in Table 4 were more general questions on hearing aids, earmoulds, and so on.

General Results (Table 3)

1. Almost all respondents (90%) knew that the voltage of a hearing-aid battery should be approximately 1.5 volts.
2. A small percentage of respondents (33%) knew that the most common cause of hearing-aid malfunction is the battery.
3. More than half of the respondents (52%) knew that the most common cause of hearing-aid "whistling" is related to the earmould.
4. A very small percentage of respondents (30%) knew that when a hearing-aid battery "dies," it does so very quickly.
5. A small percentage of respondents (19%) knew that when a hearing-aid switch is on "T" position, there is no amplification of sound.
6. Quite a large percentage of respondents (89%) knew that a properly fit hearing aid would be of considerable benefit to the wearer but did not provide normal hearing.
7. A large percentage of respondents (64%) knew that earmoulds are normally custom made for the particular ear in which they are to be used.

Table 3

Correct and Incorrect Responses on Specific Questions About Hearing Aids

Question	Responses		Percentages	
	Correct	Incorrect	Correct	Incorrect
1.	80	9	90	10
2.	29	60	33	67
3.	47	42	52	48
4.	3	86	3	97
5.	17	72	19	81
6.	79	10	89	11
7.	59	30	64	36

Discussion

The findings of this survey from questions 1-7 indicate some deficiencies in teachers' knowledge of some basic hearing-aid problems. In view of these deficiencies, it is likely that some hearing aids might have been underutilised in schools, and the likelihood of hearing aids being misused and abused cannot be denied. The findings also call for a concerted effort by authorities to provide staff development for their teachers at their schools on the functions of hearing aids and hearing-aid monitoring. As evidenced by responses to questions 2, 4, and 5, teachers need more in-servicing and information on the hearing-aid basics. More knowledge would enable teachers with inadequate skills to evaluate reliably all aspects of hearing-aid performance.

General Results (Table 4)

8. All respondents (100%) knew that the statement "A hearing aid improves a person's hearing so that after extended use he/she eventually does not have to wear it any more" is false.

9. Quite a large majority of respondents (88%) knew that hearing aids can be worn by children under five years old.
10. Almost all respondents (95%) knew that hearing aids are powered by batteries.
11. More than half the respondents (52%) knew that anyone with a hearing loss can benefit from wearing a hearing aid.
12. A large percentage of respondents (92%) knew that the statement "The larger the hearing aid, the louder it makes sounds" is false.
13. A large majority of respondents (87%) knew that the statement "Hearing aids are not useful for individuals who are over 65 years old" is false.
14. A large majority of respondents (88%) knew that the statement "The more expensive the hearing aid, the better it will improve a person's hearing" is false.
15. A large majority of respondents (83%) knew that the statement "Hearing aids usually cost more than eyeglasses" is true.
16. Almost all respondents (96%) knew that hearing aids do not bring hearing back to normal just as eyeglasses bring vision back to normal.

Table 4

True-False Responses on General Questions About Hearing Aids

	Responses		Percentages	
Question	True	False	True	False
8.	0	89	0	100
9.	11	78	12	88
10.	84	5	95	5
11.	47	42	52	48
12.	7	82	8	92
13.	12	77	13	87
14.	10	79	12	88
15.	73	16	83	17
16.	2	87	4	96

Discussion

The findings indicate that teachers were well aware of the benefits and limitations of hearing aids. Generally, teachers seemed to have had greater exposure to the general functions of hearing aids. Also of importance from the findings is that almost all respondents acknowledged that hearing aids are beneficial to those children who use them well. If one compares the results of Table 3 and Table 4, in Table 4 teachers generally seemed more knowledgeable on general aspects than in Table 3, which is specific.

Specific Results: Tables 5 and 6

Certification for teachers in Zimbabwe is described and explained in Appendix N. In Tables 5 and 6 the scores on the questionnaire have been arranged according to type of teachers' certification. Teachers who are trained to work with hearing-impaired children are those who have certification 5 and 10. Table 5 indicates results gathered from questions 1-7, which deal with specific aspects of hearing-aid knowledge; Table 6 indicates results from questions 8-16, which deal with general aspects of hearing-aid knowledge.

In the following discussion, results for each certification type have been addressed. Questions which elicited my curiosity and interest because teachers scored very poorly or very well or because findings were unexpected are discussed first.

Discussion

The findings from Table 5 show clearly that those trained to teach ordinary children, but with no experience with deaf children, scored quite poorly, especially on this knowledge level which required specific knowledge on hearing aids. An example is certification type 9 (CE/Other, n=19), where the findings show that 13 out of 19 respondents scored less than 50% (Table 5) on specific knowledge, yet on the general

Table 5

Results of Specific-Knowledge Questions (1-7) Arranged According to Type of Certification

	Knowledge level on specific questions (1-7) on hearing aids		
Type of certification	Less than 50%	51-70%	71%+
1 (n=9)	6	2	1
2 (n=0)	0	0	0
3 (n=3)	1	0	2
4 (n=14)	8	3	3
*5 (n=24)	8	8	8
6 (n=3)	0	2	1
7 (n=2)	1	1	0
8 (n=1)	1	0	0
9 (n=19)	13	3	3
*10 (n=12)	7	3	2

Certification key:
1 = PTL
2 = PTH
3 = T/4
4 = T/3
*5 = U.C.E.
6 = Diploma
7 = B.Ed.
8 = M.Ed.
9 = CE/Other
*10 = Dual, i.e., T/3 + U.C.E.
T/3 + Diploma
PTL + Diploma

* Teachers trained to work with hearing-impaired children
Certification 5: Educated and trained in Zimbabwe
Certification 10: Trained (some in Zimbabwe now, but most outside the country; e.g., U.K., Holland, etc.)

Table 6

Results of General-Knowledge Questions (8-16) Arranged According to Type of Certification

	Knowledge level on general questions (8-16) on functions of hearing aids		
Type of certification	Less than 50%	51-70%	71%+
1 (n=9)	0	1	8
2 (n=0)	0	0	0
3 (n=3)	0	2	1
4 (n=14)	0	1	13
*5 (n=24)	0	2	22
6 (n=3)	0	0	3
7 (n=2)	0	0	2
8 (n=1)	0	0	1
9 (n=19)	1	3	15
*10 (n=12)	0	1	11

Certification key:
1 = PTL
2 = PTH
3 = T/4
4 = T/3
*5 = U.C.E.
6 = Diploma
7 = B.Ed.
8 = M.Ed.
9 = CE/Other
*10 = Dual, i.e., T/3 + U.C.E.
T/3 + Diploma
PTL + Diploma

* Teachers trained to work with hearing-impaired children
Certification 5: Educated and trained in Zimbabwe
Certification 10: Trained (some in Zimbabwe now, but most outside the country; e.g., U.K., Holland, etc.)

knowledge level in Table 6, they scored quite high. As shown in Table 6, 15 out of 19 scored over 70%. Because general knowledge and general questions were involved, respondents could have guessed correctly.

Table 5 also shows that in certification type 5 (U.C.E., n=24), there is a spread of knowledge of hearing aids across the board—8 throughout. Table 6, on the other hand, shows that, as with type 9, general knowledge appears to be higher than specific knowledge. These, however, are trained teachers of the deaf who are presumed to have training in audiology, have studied hearing aids, and should have done well. This could mean that the programme at U.C.E. did not give them adequate specific knowledge of hearing aids.

For certification type 10 (n=12) in the specific-knowledge area, 7 out of 12 scored less than 50%, yet 11 out of 12 in the general-knowledge area scored above 71% on general knowledge. All these respondents have dual certification in deaf education. For example, some have T/3 and a diploma in deaf education, and others have an M.Ed. and a diploma or certificate in deaf education. The explanation for this anomaly of inadequate knowledge on hearing-aid specifics could be that the programmes offered do not have enough content on hearing aids. This could be true of some programmes taught in some countries where it is said that knowledge of audiology should be left to audiologists and that teachers should have knowledge of methodology and so on. In developing countries, Zimbabwe in particular, a teacher, once trained, becomes everything—a teacher, a hearing-aid technician, and an audiologist.

For certification types 1 (n=9) and 4 (n=14) in the specific-knowledge area, scores were low because these are not trained specialist teachers, but ordinary teachers trained to teach ordinary children; yet in the general-knowledge area, because of their experience in Schools for the Deaf, even though they had no formal specialist training, they scored quite high. Also a point to note from the findings is that certification types 3 (n=3), 6 (n=3), 7 (n=2), and 8 (n=1) are a small number of respondents, and in terms of knowledge exhibited in both the specific- and general-knowledge areas, they are inconsistent and insignificant.

The findings in the general-knowledge area show that the respondents did better on the general questions on functions of hearing aids than they did on the specific questions on hearing aids (see Table 5). In the general-knowledge area, even those without training but with experience scored over 70% (e.g., in certification type 4 [n=14], 13 out of 14; and in certification type 10 [n=12], 11 out of 12); whereas those with training (e.g., certification type 5 [n=24]) excelled: 22 out of 24 scored well over 70%. Overall, it shows that the respondents have a functional knowledge of hearing aids, although it could be said that some might have guessed well. For respondents with certification type 1 (n=9), years of experience within Schools for the Deaf helped them to score high.

Attitudes Towards Hearing Aids and Hearing-Aid Wearers (Opinionnaire)

In analysing the attitude scale, the researcher must depend on what the individual said as to his/her beliefs and feelings. This is the area of opinion (Best, 1959). Best called the information from attempts to obtain a measured attitude or belief of an individual an *opinionnaire*: how an individual feels or what he/she believes is his/her attitude. Best went further to caution researchers using opinionnaires in the analysis and interpretation of opinionnaires "because they are difficult, if not impossible, to describe and measure attitudes" (p. 156). In spite of the difficulty, opinionnaires are important as a knowledge source from the respondents.

The following findings are based on the respondents' agreement or disagreement (using the forced-choice Likert scale) with statements on the questionnaire concerning hearing aids and hearing-aid wearers (n=89).

17. I feel uncomfortable when I talk to people who wear hearing aids.

Responses	Number	Total	%
Strongly Agree	3	12	13
Agree	9		
Neutral	13	13	15
Disagree	32	64	**72**
Strongly Disagree	32		

A large majority of the respondents (72%) disagreed with the statement.

18. Hearing aids are usually a worthwhile expense for hearing-impaired persons.

Responses	Number	Total	%
Strongly Agree	48	83	**93**
Agree	35		
Neutral	0	0	0
Disagree	5	6	7
Strongly Disagree	1		

Almost all respondents (93%) agreed with the statement.

19. Children who wear hearing aids tend to feel sorry for themselves.

Responses	Number	Total	%
Strongly Agree	6	19	22
Agree	13		
Neutral	17	17	19
Disagree	34	53	**59**
Strongly Disagree	19		

More than half of all respondents (59%) disagreed with the statement.

20. Children who wear hearing aids tend to be embarrassed about their hearing aids.

Responses	Number	Total	%
Strongly Agree	11	30	34
Agree	19		
Neutral	20	20	22
Disagree	23	39	**44**
Strongly Disagree	16		

Almost half of all respondents (44%) disagreed with the statement.

21. Children who wear hearing aids are socially more restricted than those who do not wear hearing aids.

Responses	Number	Total	%
Strongly Agree	11	36	**39**
Agree	25		
Neutral	17	17	19
Disagree	27	36	**42**
Strongly Disagree	9		

Almost half of all respondents (40%) disagreed with the statement. Teachers appear to be divided on this question: 39% agreed, and 42% disagreed.

22. Children look older when they wear hearing aids.

Responses	Number	Total	%
Strongly Agree	1	2	2
Agree	1		
Neutral	0	0	0
Disagree	18	87	**98**
Strongly Disagree	69		

Almost all respondents (98%) disagreed with the statement.

23. Many children who wear hearing aids do not really need them.

Responses	Number	Total	%
Strongly Agree	17	50	**56**
Agree	33		
Neutral	7	7	8
Disagree	21	32	36
Strongly Disagree	11		

More than half of the respondents (56%) agreed with the statement.

24. Lip reading can eliminate the need for a hearing aid in most cases, but requires a lot of effort.

Responses	Number	Total	%
Strongly Agree	17	50	**56**
Agree	33		
Neutral	7	7	8
Disagree	21	32	**36**
Strongly Disagree	11		

More than half of all respondents (56%) agreed with the statement.

25. Children who wear hearing aids generally are more intelligent than those who do not wear hearing aids.

Responses	Number	Total	%
Strongly Agree	0	4	5
Agree	4		
Neutral	6	6	7
Disagree	29	79	**88**
Strongly Disagree	50		

A large majority of the respondents (88%) disagreed with the statement.

26. I would wear a hearing aid if it were recommended to me.

Responses	Number	Total	%
Strongly Agree	16	58	**65**
Agree	42		
Neutral	11	11	12
Disagree	10	20	23
Strongly Disagree	10		

Quite a large majority of the respondents (65%) agreed with the statement.

27. Considering your professional area, do you feel that academic training in hearing aids is necessary?

Responses	Number	Total	%
Strongly Agree	60	82	**92**
Agree	22		
Neutral	1	1	1
Disagree	1	6	7
Strongly Disagree	5		

Almost all respondents (92%) felt that academic training in hearing aids is necessary.

28. The academic course work on hearing aids you received from training was adequate.

Responses	Number	Total	%
Strongly Agree	1	12	14
Agree	11		
Neutral	43	43	**48**
Disagree	18	34	38
Strongly Disagree	16		

Almost half of all respondents (48%) could not decide.

29. During training, classroom preparation in the area of hearing aids was adequate.

Responses	Number	Total	%
Strongly Agree	0	13	15
Agree	13		
Neutral	41	41	46
Disagree	20	35	39
Strongly Disagree	15		

Slightly less than half of the respondents (46%) did not commit themselves to the statement.

30. During teacher training, there is no need to study about hearing aids and how they should be fitted to children.

Responses	Number	Total	%
Strongly Agree	5	8	9
Agree	3		
Neutral	14	14	16
Disagree	11	67	75
Strongly Disagree	56		

A large majority of the respondents (75%) disagreed with the statement.

Discussion

Survey questions from the questionnaire can be regrouped in the following manner: questions 17 and 26 sought teachers' feelings on children who wear hearing aids. Responses to question 17 (72%) indicated that they were comfortable with children wearing hearing aids, which was endorsed by the response to question 26, where 65% indicated that they would wear a hearing aid if it were recommended to them. These figures indicate that there is generally an agreement that hearing-impaired children who wear hearing aids are like any normal hearing children and should not be pitied or despised.

Questions 19, 20, and 21 focussed on the effect of hearing aids on children who wear them. From the teachers' points of view, as exemplified by responses of 59%, 44%, and 42%, respectively, children did not feel sorry, embarrassed, or socially restricted at all. But question 21 shows an interesting result: 36 (42%) disagreed that children who wear hearing aids are socially more restricted than are those who do not wear them, whereas 35 (39%) agreed with the statement. Because of the closeness of these responses, more research could be done to find out why. However, it is also possible that those who agreed with the statement do not like hearing aids fitted on children at all. They could be the pro-Deaf Culture group of teachers.

Questions 22 and 25 sought the teachers' beliefs on children who wear hearing aids. As exemplified by the high-percentage responses, 22 (98%) and 25 (88%), teachers' perspectives or beliefs are quite positive.

Responses to question 23 were interesting: 50 teachers (56%) agreed with the statement that many children who wear hearing aids do not really need them. These teachers could be advocates of an alternative method of educating the deaf such as the manual method. They possibly reject hearing aids as a result of the aids not functioning as expected. It is also possible that some children are indeed wrongly fitted with aids and reject them.

On the whole, myths about children who wear hearing aids being different seem to have been rejected, as depicted by the results. Almost all respondents (93%) agreed that hearing aids are a worthwhile expense for children who are hearing impaired.

(Personal) Knowledge of Hearing Aids

Questions 31-34 from the questionnaire focussed on the personal knowledge of teachers and whether the course they might have taken at the United College of Education gave them *some skills* at all on how to deal with *hearing-aid problems*. For those who did not take the course at the United College of Education, *experience* may have given them some skill in troubleshooting hearing-aid problems.

31. How would you rate your knowledge on troubleshooting hearing aids?

Responses	Number	Total	%
Very poor	17	47	**53**
Less than adequate	30		
Adequate	29	31	35
More than adequate	2		
Insufficient information	11	11	12

More than half of the respondents (53%) rated their knowledge on troubleshooting hearing aids as poor or less than adequate.

32. So far, your knowledge on hearing aids is . . .

Responses	Number	Total	%
Very poor	11	43	**48**
Less than adequate	32		
Adequate	38	39	44
More than adequate	1		
Insufficient information	7	7	8

Less than half of the respondents (48%) rated their knowledge of hearing aids as very poor or less than adequate so far.

33. Fitting of hearing aids for you as a skill is . . .

Responses	Number	Total	%
Very poor	10	40	46
Less than adequate	30		
Adequate	37	39	44
More than adequate	2		
Insufficient information	10	10	10

Less than half of the respondents (46%) felt that fitting of hearing aids as a skill was poor or inadequate.

34. Knowledge of selection of hearing aids for you as a teacher is . . .

Responses	Number	Total	%
Very poor	17	49	55
Less than adequate	32		
Adequate	21	24	28
More than adequate	4		
Insufficient information	16	16	17

More than half of the respondents (55%) indicated that their knowledge of selection of hearing aids was poor or less than adequate.

Discussion

From the responses on personal knowledge of hearing aids, it is evident that teachers feel that much can be learned about hearing aids. These responses reveal that the respondents are not confident of themselves on the use of hearing aids. In question 33, 46% of the respondents stated that they have little knowledge on fitting hearing aids; although, in the same question, 44% stated that they have adequate knowledge. In question 34, 55% of the respondents indicated that their knowledge of the selection of hearing aids was poor, and teachers themselves tended not to feel very competent in this area. All this points to the fact that more needs to be done in the programme of training at the United College of Education. More information on hearing aids, how they function, troubleshooting, and so on should be included and taught. Teachers must be knowledgeable to benefit children's hearing maximally (Muskett, 1988).

Overall, the questionnaires revealed that there were gaps in the teachers' knowledge about hearing aids and their care. Teachers appeared to be aware of these inadequacies, especially at the specific-knowledge level. The responses presented a challenge that must not go unanswered if a solution to the dilemma of malfunctioning hearing aids is to be found.

Interviews

In this current research, benefit of hearing-aid use is not defined in terms of improved speech intelligibility (not how they speak, but how they hear), but in terms of amplification, especially whether deaf children in Zimbabwe really hear with the aid and gain something from it. However, hearing alone without proper fitting would not yield any benefits. To gain maximally with the proper use of aids, some variables first have to be considered: hearing loss, the listening environment, and amplification. In research carried out by Cox and Alexander (1993) on the benefits of wearing hearing aids, they reported that one could never speak of hearing-aid benefits without taking cognizance of other variables; for example, listening environments, signal-to-noise ratio in classrooms, speech-level reverberation characteristics, and speaker intelligibility. They went on to say:

> Each of these variables has an impact on the amount of benefit that an individual will realise from amplification. Because hearing aid benefit is complex, it is not possible at this time to accurately predict the amount of benefit that can be expected from a particular hearing aid fitting in various types of listening environments. (p. 275)

In everyday life hearing-aid wearers must function in a variety of listening environments, but relatively few objective data have been reported to indicate the benefit obtained by typical hearing-aid wearers in listening conditions similar to those of daily life. Cox and Alexander (1993), for example, reported hearing benefit in three listening environments. These three listening environments were a living room, a classroom, and a cocktail party. *Benefit* here was defined as improvement in intelligibility of conversationally produced, connected speech when amplification was used. In this current research, all who responded that children benefitted from wearing hearing aids were not asked to qualify their statement. The participants showed what it meant in the interview. My research has not involved testing intelligibility or measuring the benefit of hearing-aid use.

To analyse the data from the interviews with teachers and heads of schools, the interview questions were grouped to reflect the following major themes: benefits of hearing-aid use to children, teachers' level of knowledge and comfort working with hearing aids, and problems encountered in the use of hearing aids in schools. These themes are now described. Responses come from five teachers, six heads, and five deputy heads who were interviewed.

Interviews with Teachers, Heads, and Deputy Heads of Schools

Theme 1: Benefits of Hearing-Aid Use

In the interview sessions, some interviewees expressed the feeling that some children benefit from hearing-aid use, whereas others felt that children benefit only if certain conditions are satisfied.

Total agreement. Of the total number (16) of interviewees, five expressed without reservation that children benefit from hearing-aid use. The benefits were exemplified in the following responses of the interviewees.

Teacher 2: They do benefit greatly because they *pick out* some of the essential points in a discussion.

Teacher 3: But when you give them a hearing aid, you find your *communication* improves. They can lip-read better.

Teacher 5: As far as I am concerned, from the experience that I have had with my little children, I think they benefit. For example, I have a kid who came into my class at the beginning of the year. She didn't have a hearing aid, and she couldn't even register if there was sound. Now, when she got those hearing aids, she could actually register that there is a sound somewhere, and she even tries to *imitate* you saying something. Especially, it improved her lip reading. Now she can actually say out words.

Deputy Head 1: I think hearing aids do help them, because when you call them they understand, for they *respond*. But if the hearing aid is switched off, they act differently. I feel they benefit.

Deputy Head 5: Yes, they do [benefit]. You can see in actual fact, especially if you fit a hearing aid. Although we haven't got the machines to test that they can hear and how much they hear, you can see from the child's face and response whether he is hearing more or less, and they will tell you if they can't hear.

Summary. From the interviewees' responses, it is clear that hearing-aid use enhances communication, as indicated by lip reading, imitation, response after being called upon, and complaints if the aids are not working. The respondents also mentioned improved hearing and listening skills with the use of hearing aids, exemplified in Teacher 5's story. The child exhibited self-motivation when she imitated sounds heard through the hearing aid. This point was well supported by Deputy Head 1, who stated that children wearing hearing aids respond when called upon. All five respondents indicated the usefulness of hearing aids to children in their communication.

Conditional agreement. Eleven respondents (two teachers, six heads, and three deputy heads) suggested that *conditionally* children benefit from hearing-aid use. The conditions cited were pertinent to the Zimbabwean situation. The interviewees responded as follows:

Teacher 1: [They benefit] *in some cases, yes.* Like those who have got residual hearing, it helps to amplify the sound, and it is shown in the response. Some of the children respond when they have the hearing aids on. Also, to benefit

> more, children should be *allowed* to wear these hearing aids *all the time*, because it's not only to be used when they are at school; they should use them wherever they are if they are to benefit.

As implied in the teacher's response, and as previously mentioned, hearing-impaired children in Zimbabwean Schools for the Deaf and integrated units are given donated hearing aids at school, which they use only at school; when they go home they leave the hearing aids at school.

Teacher 4 felt that not all children benefit because "there are some children who do not respond to sounds whether the volume is high or low." This teacher recognized that hearing aids may not be useful for all children because of the degree of loss. Head 1 also suggested that "there are times when in an individual class a few children don't seem to be benefitting," but he/she went on to imply that it might be "because we don't have the earmould materials so that they will benefit most with actually tight-fitting earmoulds."

Head 2 supported Head 5, but also took a different view:

> I am on the fence. Personally, I feel that with the profoundly deaf, the only real benefit of the hearing aid is to make children aware of the existence of sound, and I feel that they have a part to play in auditory training, making children aware of sound. However, I feel that with the hearing aid, when a child comes to school wearing a hearing aid, I feel there is immediate bias, because you see that hearing aid, and then you try to work with the child using—I have seen it done—oral approaches, whereas I feel that a signed approach or a manual approach would be beneficial.

Head 2 and Head 5 appeared to be critical of the use of hearing aids on the whole. They suggested that hearing aids might not be beneficial to profoundly hearing-impaired children, and they advocated that alternative approaches be used. They are both advocates of diversity and indicated that children benefit not from wearing hearing aids, but from using the most suitable approaches. Misdiagnosis and misfitting may have an impact on hearing-aid use.

Head 3 brought in a new dimension in that he believed that "it's the *human input* that is always the most important when teaching the deaf." He also stated that "the assistance of the hearing aid must be considered to be a very valuable one—provided it is maintained, provided the earmoulds are fitted correctly, provided the new batteries are fitted when needed." What the head seemed to suggest was that maintenance and care of hearing aids are important if children are to benefit maximally from hearing-aid use, as well as the fact that all those who use hearing aids should have knowledge of the important parts of hearing aids and of the accessories that make them work; for example, batteries and earmoulds. What the head implied was that benefits of hearing-aid use are derived from a perfectly working hearing aid and that teachers must know what to do in case of malfunctioning aids.

The same sentiment was expressed by Head 4, that "much depends on the teacher who is in front of the children, the child itself, and maybe the environment in the community—how supporting these people are." The head went on to say, "The hearing aid on its own does not help at all. But it cannot just help without the people supporting and assisting the child to benefit from it."

Head 4 also considered teachers' knowledge and support of hearing-aid use important. He/she went further to stress that hearing-aid benefit depends not only on the teacher, but also on the child him/herself and the child's environment. This idea was also investigated by Hodgson (1988), Rupp, Higgins, and Maurer (1977), and Giolas, Owens, Lamb, and Shubert (1979). The community provides the hearing-aid wearer with encouragement and understanding; in addition, the hearing-aid wearer may learn to communicate and accept responsibility for this important hearing gadget. Head 4 realistically felt that hearing-aid benefits emanate from the combined efforts of family members and the school.

Head 6's views focussed on the critical importance of hearing aids in the school system as well as in the community:

> Well, I think hearing aids are very useful aids for the children. If they are going to learn anything at all from our school system, hearing aids are very vital, yes, because they help communication between the teacher and the children. Yes, they do; they do benefit greatly. But, unfortunately, they only wear them at school, and when they go home, they have nothing. Children should be allowed to take them home, because they have to use these hearing aids for life, you know, for communication—communication in the community. Now it seems it's only communication with the teachers—what is that?

The views expressed by Head 6 were very valuable indeed. In the Zimbabwean school system, especially in the integrated units where sometimes hearing-impaired children are taught by untrained teachers, if children are to learn anything, they must be able to follow verbal instructions and have to make use of hearing aids. It is a critical situation for hearing-impaired children. The assumption that if children wear hearing aids they can hear is an incorrect assumption that needs to be rectified because teachers and children must learn to use hearing aids properly. This head expressed concern about hearing aids being used only at school. He/she suggested, as others had done, that for children to benefit maximally, hearing aids must be worn *all the time,* including at home. In addition, however, the head further felt that hearing aids should be used for communication and that communication between teachers and children leaves much to be desired and should be further extended to the community.

Deputy Head 2 partly agreed with what was stated by Head 3, that "only children with fitting earmoulds" will benefit from hearing-aid use. He/she seemed to believe that profoundly deaf children, those who have not acquired language, would not benefit; but those who became deaf after acquiring language and the partially deaf would probably benefit from hearing-aid use.

Deputy Head 3 also responded thus: "I think they do [benefit]. Of course, depending *on the gravity of hearing loss.*" This deputy head supported Deputy Head 2's opinion, especially concerning the profoundly deaf and whether they benefit from hearing-aid use. The contention is that a profoundly hearing-impaired child should not be fitted with a hearing aid because that child will not benefit from it.

However, this is not always the case, as the literature indicated (Valente, 1994): much depends on how motivated the profoundly hearing-impaired individual is and on how powerful the hearing aid is. More investigation is needed into why these deputies believed that profoundly deaf children do not benefit from wearing hearing aids.

Contrary to the views of Deputy Heads 2 and 3, Deputy Head 4 commented on why even profoundly deaf children should be fitted with hearing aids:

> Okay, we have 212 children, and we try to make sure that each child wears his/her hearing aid. We believe that even those who are very, very deaf, if they are *trained* to use a hearing, will benefit from it. That's why we want every child to use a hearing aid. And also because these children, when they come to school, haven't been properly tested; and for us the hearing aid is another way of testing whether the child can use a hearing aid or not and whether the child can benefit from a hearing aid or not. I do believe the children benefit from the hearing aids.

Deputy Head 4's views are in conflict with the literature on benefits of hearing aids to children, as well as on the procedural principles of testing children before fitting them with hearing aids. He/she felt that *all children* should wear hearing aids despite their degree of hearing loss, and that *all children* should be trained to use hearing aids. There is no research to support the theory that children should be fitted with hearing aids before they are tested. All the literature on the fitting of hearing aids indicated that children are first tested, an audiogram is taken, and they are oriented to sounds before a hearing aid is fitted. It may be that because proper fitting is unavailable to the students, the wearing of the aid becomes the evaluation itself.

However, further into the interview, Deputy Head 4 consented that "there will be some children who don't benefit—those who are really stone deaf—and no matter what you do, it might even do more damage. They don't." He/she therefore realized that a wholesale statement that *all* children will benefit from wearing hearing aids would not work. The reality is that some children will benefit from the use of aids, but not all; thus, some educationists consider using other methods (e.g., ASL or any other method understood by the majority of profoundly deaf children).

Summary. In spite of the diversity of opinions, all the interviewees felt that hearing-impaired children benefit from hearing-aid use. They went further to suggest that, where children do not benefit from the use of hearing aids, alternative methods have to be employed to help children communicate. Some teachers and heads expressed the feeling that children should be allowed to wear hearing aids *all the time* and to take them home. Others suggested that hearing aids should be fitted to those children who are partially deaf rather than forcing all children to use aids.

Theme 2: Teachers' Level of Knowledge of and Comfortability With Hearing Aids

If children are to benefit from the use of hearing aids, the contention is that teachers should be knowledgeable about the functions of the hearing aids. Studies by Busenbark (1984) pointed to the importance of teachers' knowledge in identifying malfunctions of hearing aids and in the effective use of aids to help children benefit from them. Lass et al. (1987) in their survey indicated that deficiencies in teachers' knowledge of, exposure to, and attitudes toward hearing aids and hearing-aid wearers have serious implications for the use of hearing aids and therefore for their benefit to children. Kemker et al. (1979) stressed that teachers' active participation in hearing-aid monitoring, once they are knowledgeable, is very crucial in identifying mechanical defects which interfere with children's classroom performance. All the research pointed to the teachers' level of knowledge of hearing aids as paramount if they are to be used effectively in schools. Questions 31-34 in the questionnaire sought teachers' level of knowledge and skills in using hearing aids, and questions 1-7 were specifically on knowledge of hearing aids. In questions 31-34 teachers indicated minimal knowledge: most of them rated their knowledge of hearing aids as poor.

According to the responses to questions 1-7, overall, teachers had some idea of hearing aids, but their level of training was evident in their responses (see Table 3).

The interview data allow for a more insightful understanding of the participants in terms of their knowledge and comfort levels with aids and their uses. Some participants expressed their comfortability with aids, whereas others expressed uncertainty, and yet another group felt quite concerned. These groupings are discussed below.

Very few of the participants expressed total satisfaction with their knowledge. Of the 16 interviewees, only Teacher 2, for example, expressed the view that he/she was adequately knowledgeable about hearing aids; thus he/she felt quite comfortable working with children wearing hearing aids. This respondent was a resource person in the school who might have taken the course at the United College of Education and had some further inservice on hearing aids.

Heads 2 and 3 felt, from an administrative perspective, that their teachers' level of knowledge of hearing aids was adequate. They suggested that teachers could easily monitor the functioning of hearing aids.

> It's interesting you ask me that, because we have two teachers here who went on a course on the *maintenance and repair* of hearing aids, and they learned how to make earmoulds. But they don't have the equipment to give us so that we can repair these in school here. I believe some schools have them; we have not been fortunate. My teachers have a good knowledge, generally speaking, of the use and benefits, and they know how to pick up obvious signs of malfunction in the hearing aid. We are lucky here, because we have a lot of teachers who have been here quite a while, and what we usually do is, at the beginning of the year—I haven't done it this year because it was not necessary—I bring the hearing-aid consultant here, who explains to the teachers exactly how it should be working, what they should look out for, etc.

The head of this school felt lucky because there are teachers with expertise at the school who are able to maintain and repair malfunctioning hearing aids. However, although the teachers have the expertise, they are hindered from doing their work because of a lack of essential material, especially for making earmoulds. As already stated in other interviews, the earmould seems to be the main cause of trouble. Teachers at this school, as the head asserted, have adequate knowledge of hearing aids and could troubleshoot hearing aids for problems. As a resourceful head, he/she often enlisted the help of a hearing-aid consultant. The head complained about the unfair distribution of earmould-making material and maintenance and repair equipment by the administering Department of Special Education in the Ministry of Education and Culture. In fact, the unfair distribution could be a sign of a shortage, which is cited later as a problem which heads of schools and integrated units encounter.

Head 3 encouragingly agreed with the sentiments of Head 2:

> We have the expertise on the staff. We have two teachers who have been doing courses for some time on repair and maintenance. One of them has been overseas, and both of them have done a course with the Canadians, so we have the expertise here, and we have the knowledge. . . . It's very good, because all—I am just checking—yes, all our teachers of hearing-impaired children at this school have had special education training, so I believe the knowledge level within the school is very good. We have two who have an exceptional amount of knowledge and who are willing to impart that to and share some knowledge with their colleagues.

The head acknowledged his/her teachers' expertise at the school. This head of school seems to encourage his/her teachers, especially those who participated in inservicing and staff development by CIDA experts who came to Zimbabwe in 1991 for six weeks. It was a comprehensive course on maintenance and repair of hearing aids. As already mentioned, in spite of that knowledge on repair and maintenance, teachers cannot do much because of a shortage of equipment, but what is useful is that teachers can troubleshoot and identify faults. At a school such as this one, where all the teachers are trained, faults can be easily identified. One can conclude that effective use of hearing aids is made at this school; hence, the teachers' expertise is of benefit to children wearing hearing aids.

It is obvious from the teacher's response and the heads' endorsement that if teachers have adequate knowledge of hearing aids they are comfortable in using them, and that they use their expertise and show confidence in whatever they do, while at the same time helping children to maximize the use of hearing aids. The heads acknowledged that adequate knowledge of hearing aids is of paramount importance if children are to benefit from hearing-aid use.

Thirteen other respondents, however, expressed some concern about teachers' knowledge of hearing-aid use. Four teachers, two heads, and five deputy heads expressed reservations, whereas two heads were not impressed at all with their teachers' operating levels.

Teacher 1 responded as follows:

> [I don't know.] I am not quite safe when we talk of hearing aids as such, because, as it is, I find those children were tested long back, but now I don't know whether they are still functioning the same as at the time they were tested. They [the children] are not tested. Not to my knowledge.

This teacher appeared to be genuine and honest. This comment is also reflected in the personal knowledge questions (31-34) of the questionnaire (Appendix A), where almost half of the teachers (48%) responded that their knowledge of hearing aids was very poor. In the verbal responses, this teacher brought up another dimension: that these children were tested a long time ago. He/she doubted whether children were gaining anything from hearing aids. The respondent implied that for children to gain from hearing aids, they should be tested frequently and that hearing aids themselves should be functionally monitored. Because the respondent did not have adequate knowledge of hearing aids, he/she did not feel quite comfortable.

Teacher 3 said: "No, no. I feel I haven't been exposed to using them for a long time. I think we should have further training material." This teacher expressed that he/she was not comfortable with hearing aids. The reason for the discomfort was the feeling that he/she did not have enough exposure to the use or function of hearing aids. The same teacher suggested more training in the use of hearing aids, as well as more back-up material. The teacher was likely to be one of those who, in questions

31-34 in the questionnaire (Appendix A), rated themselves as very poor on their knowledge of hearing aids.

Teacher 4 also said: "I feel comfortable when I am working with children who benefit from hearing aids. If they are not putting on their hearing aids, they do not respond; but if they are, they do respond." The respondent agreed conditionally that he/she was comfortable only when children benefitted from wearing hearing aids. This teacher seemed to imply that children should always wear their aids to make use of them. He/she was also concerned with children's responding, which facilitates communication.

Teacher 5 responded as follows: "Fairly comfortable. With the little knowledge that I have, I work with them fairly comfortably." This teacher expressed that he/she was comfortable with hearing aids but admitted a need for more knowledge. As indicated in question 27 in the questionnaire (Appendix A), 92% of all respondents indicated that more knowledge on hearing aids was necessary during training.

Head 5 stated:

> We have some teachers who have gone for specialist courses who do help others with the fitting of hearing aids to children, and these specialist teachers, because we have some teachers who have not yet gone for training of other teachers in the use of hearing aids. . . . Most of the teachers generally need more knowledge and more training focussing specifically on hearing aids. They have to be given the knowledge of working with the hearing aids. Perhaps one way of doing that is to specialise in the use of hearing aids while at the college or wherever they train.

Head 5 had some trained specialists at the school whom he/she used to help others. But he/she also suggested that most of his/her teachers needed more training and that the course content at the United College of Education should have more training on the use of hearing aids. In the interview the head implied that the course at the United College of Education "lacked a practical element" on hearing-aid use, which, according to him, is important to help teachers function. In the researcher's opinion, what the head stated concerning the lack of a practical element in the United College of Education course is true, because the programme's duration is one year, which is not enough time to teach all the theory and to include a six-week teaching practicum. More research could be done on the United College of Education programme.

Head 6, in one of the integrated units, stated:

> The teachers we have here, like this lady, are trained in the maintenance of hearing aids. She is knowledgeable on how to fit hearing aids. Yes, the teachers are, but I would like to think they need more training, because these hearing aids sometimes would need to be repaired and also to be serviced. So all my teachers should be in a position to service the hearing aids. This is a very vital instrument which should be working all the time.

Head 6 felt fortunate to have a trained member of staff who could maintain hearing aids. However, the situation was still not satisfactory for him; he/she said that hearing aids sometimes malfunction and need to be serviced, but it could be too much for one person to do. The head suggested that all the teachers need more training and inservicing so that they can repair and maintain hearing aids because, according to him, a hearing aid is a "vital instrument" that should be used by children all the time.

The deputy heads discussed different aspects of teachers' level of knowledge of hearing aids. Deputy Head 1 stated:

> The last time we tested children was in May, and that teacher was able to handle the hearing aids. He was able to use *all* the machines and test this and test that. But this time he has left and we have ladies who are *not as good* as the other person, though the other lady knows how to handle hearing aids, yes. They do know, but I feel they should be given *more knowledge*.

Deputy Head 1 pointed out that among their members of staff they had one or two members who had good knowledge of hearing aids. Whether that knowledge was shared or not was not clear. The deputy head felt that the teacher was able to handle the hearing aids but did not clarify whether that handling involved servicing, monitoring, or functional help to children. The interviewee also felt that the other teachers needed more knowledge on hearing aids. This need for more knowledge was a recurrent theme in the interviews with teachers and heads and therefore requires serious consideration.

Deputy Head 2 discussed teachers' training:

> Those who have been to United College of Education have some knowledge on the use of hearing aids. Those who have not been there, we are from time to time giving them staff-development seminars or talks on the use of hearing aids, their maintenance, and what one should do for beginning teachers when they must test the hearing aids.

The deputy head reported that this school has some teachers with knowledge of the use of hearing aids who participated in staff development and gave talks on the maintenance and use of hearing aids. This sharing of knowledge among staff members seems to be a trend in Zimbabwean Schools for the Deaf that could result in even those teachers in Zimbabwean special schools who are not trained in the use of hearing aids and other devices gaining functional knowledge. Although their knowledge might be minimal, the teachers would be made sufficiently aware of how hearing aids function and how to monitor their use.

Deputy Head 3 concurred with the above idea: "We think teachers could do that [fit hearing aids] if knowledge could be improved to the teachers, but they are able to do it." What he/she was reporting was that some teachers at that school were able to fit hearing aids, but it was not clear how they did so, because proper fitting is a process which starts with the selection of hearing aids, earmoulds, and so on. Although teachers do that, the deputy head still believed that they should have improved knowledge. This would necessitate more staff workshops on the fitting of hearing aids to improve teachers' knowledge. Every school seems to have some members of staff who contribute to staff development.

Deputy Head 4 reported that "there are myself and two other members of staff, including the head, who did an audiological maintenance course on hearing aids. Other teachers I think need a very good, thorough knowledge on the hearing aid and its functions." This deputy head reported that he/she and the head of the school were trained, which meant that these two administrators were able to monitor and help their teachers when they reported malfunctioning hearing aids, but others needed more thorough knowledge. Both the head and the deputy head of this school participated in staff development to train their teachers in troubleshooting simple hearing-aid problems. Their idea of staff development was endorsed by other deputy heads. Deputy Head 5 said:

> Definitely, teachers need both inservice and staff development. We have been trying having a meeting weekly, and then it was fortnightly, to pass on the knowledge that we had from the course, but time is very short. But we do definitely need more knowledge ourselves and/or our teachers. Knowledge is shared as far as possible with the units.

A great deal of activities were reported at this school. The administration encouraged sharing of knowledge on all aspects of the hearing aid. As reported, those teachers who have taken the maintenance course were encouraged to share their knowledge at weekly and fortnightly meetings. Admittedly, still more knowledge is needed.

This urban school also has to inservice integrated units, where most teachers are not trained in special education. The deputy head reported that there were sharing of knowledge and interaction between this school and the integrated units. This professional interaction between a special school and the integrated units is encouraging and encouraged, because untrained teachers tapped into the knowledge of teachers at the special institution where resources were concentrated.

Heads 1 and 4, who seemed not to be impressed by their teachers' operating levels, expressed themselves in the following manner:

> Head 1: They don't [know], they don't at all. This is the problem that we have had, and it does seem to come from—I don't know how much experience they are thrown into at their training college because I didn't actually attend the local college. Otherwise I would be in a position to know how far they are helped in that direction. Otherwise the trained teachers, when they come here, they seem to require that knowledge. . . .
>
> I think teachers should be able to understand the elementary bit of audiology, be able to interpret an audiogram to the benefit of children. The teachers must realise and know how to adjust a hearing aid, control it, and when perhaps to ask for a new battery. Actually, those are elementary things. Otherwise those are little problems that teachers come

> across. They have to be able to interpret, to know whether the child is benefitting at all from the hearing aid, and hence to know what to demand form the child as far as speech is concerned. Otherwise if teachers are not knowledgeable, they fail to target. I recommend further training and inservicing of teachers on hearing aids.

It is clear that this head was not impressed with his/her teachers' level of knowledge of hearing aids. He/she suggested that the college where these teachers trained should have given them more information on hearing aids, especially on the interpretation of audiograms and on problems with hearing aids themselves; and also that teachers should be trained to test the hearing-loss level of the child. He/she went further to recommend that teachers should be trained or inserviced on the use and functions of hearing aids. Such valuable comments came from a knowledgeable head of a school.

Head 4 expressed reservations and brought out some important issues. He/she said:

> In other classes some children do not benefit at all because the teacher doesn't know how to help the children on how to use hearing aids. And maybe the *attitude* of the teacher towards the use of the hearing aid may also influence the child into thinking also that this gadget is useless. And then they may throw it away. The poor child who doesn't know what could be done with the gadget also begins to hate the hearing aid.

This head was also genuinely concerned about the rampant instability at his/her school caused by the movement of teachers. Some highly qualified teachers at this school have been promoted to head ordinary schools. The head sadly stated: "So we are forever receiving new teachers and releasing old qualified teachers." Unsure of his/her teachers' level of knowledge on hearing aids, the same head said:

> So I do not come to a time when I say my teachers now know. New teachers whom we have find it rather difficult, so you can imagine that one cannot boast of the level of knowledge of hearing aids among one's teachers.

The head of this school seemed to have perpetual problems since his/her school became a recruiting ground. The situation is made worse because some of the new teachers who come to the school may not have been trained at all, and others could be newly qualified teachers without experience with hearing-impaired children. These teachers will therefore see hearing aids for the first time in the classroom. What this means is that the head and the deputy head will have to *teach* these new teachers the functions and use of hearing aids. Thus, the head sounded discouraged.

Summary. Although the respondents expressed different views on the comfortability and knowledge level of teachers on hearing aids, all felt that teachers needed to be knowledgeable and needed more specific and relevant knowledge of hearing aids. Comments that teachers, heads, and deputy heads needed more knowledge of hearing aids confirmed the questionnaire findings in questions 31-34, where teachers responded that their knowledge of hearing aids was inadequate; therefore, they felt uncomfortable working with hearing-impaired children wearing hearing aids. The suggestion from all the interviewees was that teachers' knowledge on hearing aids could be improved through inservice courses and by increasing the hearing-aid content in the United College of Education programme.

Theme 3: Problems With Hearing Aids

> Hearing aids are the most important resource available for the habilitation of hearing-impaired children. However, the instruments are prone to physical and electroacoustic breakdowns. Common defects include clogged earmoulds, weak batteries, intermittent controls, frayed cords, racked tubing, poor frequency response and excessive distortion. (Musket, 1988, p. 200)

Generally in this research, all 16 interviewees identified different problems with hearing aids: (a) earmoulds and their related problems, (b) battery problems, (c) attitude problems, (d) problems of hearing-aid use/wearing hearing aids only at school, (e) problems of hearing aids donated without specifications, and (f) lack of support services.

The interviewees discussed the problems with hearing aids as follows:

Earmoulds. Two heads and two deputy heads stated that they did not have "earmould material . . . [to] benefit children most with tight-fitting earmoulds." Two teachers identified a similar problem but reported that "because there is no earmould material to make new earmoulds, children outgrow the old ones, and there is a subsequent problem of whistling." Three teachers reported that "earmoulds are ready made and do not fit children properly, resulting in a lot of whistling in the classroom." To help minimize this problem of whistling in their schools, most of the heads and deputy heads reported that they ended up fitting "plastic tips" instead of using unfit earmoulds.

Batteries. Two respondents reported the problem of procuring batteries for hearing aids. Head 4 stated: "Other problems I have are batteries, which are a thorn in my flesh." This head further explained that "batteries are expensive," and his financial resources had run out. Deputy Head 3 said: "Recently we had problems with batteries." The school, as he/she further explained, could not procure enough batteries for all the children because the number of children in the school had increased.

Obviously, batteries are the important energy source for hearing aids, and without them hearing aids cannot function. One of the respondents had a very good suggestion to minimize this problem of batteries:

> I would like to see hearing aids which take some sort of solar power, because in this part of the world here we have natural resources. You know, batteries which could be charged, recharged using solar power, where we do not rely too much on the expense of batteries.

This suggestion is valuable, especially in Africa where temperatures sometimes are unbearably high. Research in this area could solve the battery problem. Currently in Africa, only Kenya has begun using solar-powered batteries in hearing aids. More information and knowledge are needed before people start to work on it, but this could be a very useful venture.

Attitudes. Two heads of schools were concerned with the problem of attitudes exhibited by some of the teachers and other people to older deaf children wearing hearing aids. Head 3 said: "Another problem we seem to notice here is that of attitudes of people to older deaf children wearing *body* hearing aids." He/she explained that, because of little or no knowledge of the usefulness of these aids, people laugh at these deaf children.

Head 4 identified almost the same problem of attitudes:

> Maybe the attitude of the teacher towards the use of hearing aids does influence the child negatively; hence the child begins to hate the hearing aid. Our senior students seem not to like the body-worn hearing aids now—though not all of them.

The problem of attitudes that these two schools experience is becoming a wider problem in all Zimbabwean schools where there are school-leaving adults. The school-leaving older deaf children do not like to wear body aids; they prefer behind-the-ear hearing aids for cosmetic reasons. The heads reported that deaf students say, "wearing this aid with a piece of cord hanging from the ear to the pocket and then this box . . . arouses unfavourable attitudes." However, schools cannot afford to buy these aids because of limited financial resources, and the problem of proper-fitting earmoulds still exists. As for the teachers' exhibiting certain attitudes, this could be due to a lack of self-confidence in working with hearing aids as a result of inadequate knowledge of the functions of hearing aids which students use. This issue of attitudes requires further research.

Hearing-aid use/wearing hearing aids only at school. It has already been suggested that students benefit from aids only if they wear them continuously. This was also seen to be a major problem. Three respondents—one teacher, one head, and one deputy head—felt very strongly that hearing-impaired children should be "allowed to take hearing aids home and wear them all the time." As the situation is in Zimbabwe at the moment, "children wear hearing aids at school and must leave them when they go home." One head remarked that "this problem of children leaving their hearing aids at school when they go home affects children's communication with their parents and the community." It is unfortunate that parents cannot afford to pay for these hearing aids. Although it is a noble idea that children take hearing aids home, it would create another problem: that of monitoring hearing aids at home and follow-up to see if parents encourage children to make proper use of the aids.

Hearing aids donated without specifications. Two heads of schools, Heads 2 and 5, discussed this problem:

> We have problems with hearing aids which are mostly donated to us without specifications. What we are getting at the moment are just gadgets, . . . and I think they [donors] assume that perhaps we know how to use these gadgets.

Obviously, hearing aids donated without specifications pose some insurmountable problems because teachers do not know how strong they are, their MPO, and so on; therefore, hearing aids are likely to be underutilised. Reportedly, hearing aids are donated to some schools without specifications from the manufacturers, which could mean that these donated aids are second-hand aids that may have been used before finding their way into Zimbabwe. As well, fitting children with hearing aids without knowledge of how powerful they are could be damaging to children. This is an area which could be explored further to prevent irreparable damage.

Lack of support services. One teacher and one head reported the problem that "only aids are donated to schools, and no one supports us when hearing aids malfunction." Head 1 went further to say that, due to this lack of support from the hearing-aid donors, "there is plenty of *abuse* and *misuse* of hearing aids" in schools. This is a genuine concern which should be looked at critically. Support services are important and should be given by the Ministry of Education through providing required materials, inservicing, and staff development; and by the donor agencies through supplying spare parts for the donated aids and, importantly, specifications for these donated aids.

Summary. All the interviewees stated that they had problems with hearing aids and were aware that hearing aids help children hear better when the aids work well. They were also aware of the need to look after the aid and its parts for it to work well and to lengthen its working life. The interviewees also realized the importance of the earmould and that *improper fit* and leakage cause squealing or whistling. Some suggested that children should be allowed to take their hearing aids home and wear them *all the time*. Craig, Sins, and Rossi (1976) stated: "A child's hearing aid can be a vital aid to his understanding—if he wears it and wears it consistently" (p. 42). Other interviewees were also concerned about the lack of support services after hearing aids have been donated. They suggested that "follow-up and some inservice are very necessary."

Interviews With Hearing-Aid Technologists

The themes for my interviews with hearing-aid technologists centred on what their jobs actually involve: (a) maintenance, repair, and assessment of hearing aids; (b) whether they are practising in the field in which they trained; (c) problems they encounter with teachers and administrators; and (d) problems with hearing aids specifically.

My interviews focussed on the above themes because all the complaints of the interviewees (teachers, heads, and deputy heads) could be solved if technologists were given the chance to practice what they trained for and could become itinerant technologists who visit each school to maintain and repair the expensive donated hearing aids. At the same time, they could inservice teachers on monitoring hearing aids.

On the question of maintaining and repairing hearing aids, Technologist 1 said: "Since I came back into the country, I have been manning the workshop here and doing some assessments and fitting hearing aids to our hearing-impaired children."

The school where this respondent is based has gained from his/her expertise, whereas other centres do not have expert technologists. Technologist 2's response to the same question of maintaining and repairing hearing aids was,

> Since I came here I've been doing a bit of servicing of hearing aids, and I have helped sometimes in some inservice training courses for teachers of hearing impaired; you know, giving them a little bit of knowledge on the basics, on just how to run simple daily tests on their hearing-aid systems.

From this respondent's report it is evident that his/her expertise has been used to help other teachers. If this practice can be encouraged nationally, problems with hearing aids can be minimised, ensuring that hearing aids are effectively used in schools. Hence, children who wear them would benefit from functioning hearing aids.

On the second question of whether the technologists are practising what they trained for, Technologist 1 stated: "Well, to some extent. Basically, we do not have a well-equipped workshop, because certainly some of the equipment we do need is not available, and then that's a constraint." Obviously, he/she cannot operate efficiently without suitable equipment. There are constraints due to the unavailability of equipment.

Technologist 2 responded to the same question as follows:

> In part I am, but principally I'm not. The problem is, the Ministry of Education and Culture doesn't have a position where it can take people as hearing-aid technologists. They can only be taken as a teacher and do hearing-aid technology as a sideline.

The respondent, though enthusiastic to do what he/she trained for, felt discouraged because the Ministry of Education and Culture does not recognize this important qualification per se. This lack of recognition imposes some constraints on these practitioners, because even if they ask for suitable equipment for the maintenance and repair of hearing aids, the Ministry of Education and Culture would not understand their request. This important issue should be pursued with those in authority. It is hoped that this research will contribute to an understanding of the importance of hearing aids and their benefits to children if they are well monitored and maintained.

On the problems that they encounter with teachers and administrators, Technologist 1 said:

> With the teachers, there are very few problems because we meet and hold some staff-development programmes, so if we have a problematic area, we usually sit down and share together and enlighten them on what we expect them to know.

This response is a good indication that there is sharing of knowledge which could be beneficial to the children whom they teach.

Regarding the administrators, Technologist 1 reported:

> Well, this being a private school, you will find perhaps what you know may be difficult to put across for the administration to agree with you. So you may think this is important, but in the eyes of the administrators, if they don't agree, they may not be in a position to help you.

It is clear that the respondent felt that he/she was not respected and was misunderstood. This misunderstanding is a hindrance to efficient operation and may have been the cause of another technologist's leaving the area of teaching hearing-impaired children. To resolve the issue, more sensitivity to and awareness of the need to utilise these resource people should be encouraged through seminars and workshops. The role of hearing-aid technologists should be focussed on helping administrators appreciate their services.

Technologist 2 discussed the same issue:

> The problem principally is that there is very little knowledge of hearing-aid technology in this school, and whenever you try to make recommendations for orders and what changes could be implemented in as far as the procurement of these hearing-aid systems and so on, you don't get a good response, because usually people don't understand what you are talking about, and you find such a barrier with quite a few almost everywhere.

According to Technologist 2, there is very little cooperation between the staff and their hearing-aid technologist. The administrators seem to block whatever course the technologist takes. Dialogue is needed in this school if progress and improvement are to be realised. What might help as well is to run a workshop at the school with outside help to make the whole school aware of the need for sharing.

Responding to the question on problems with hearing aids themselves, Technologist 1 said, as others had before:

> Firstly, with the shortage of material, especially with the earmoulds. We don't have a supply in the country, so we depend on donations and supplies from other countries, so that you find perhaps the situation at the school is critical. We have got the hearing aids, but we don't have the earmould material, so one can't fit the hearing aid.

The serious problem of earmould material was mentioned again. According to Technologist 1's comments, this is a perennial problem which has reached a critical point. This respondent indicated that it may not be useful to fit hearing aids without the earmould material required to make better fitting earmoulds for children, which would prevent leakages and be of benefit to children.

Technologist 2 reported the following problems with hearing aids:

> The major problem with hearing aids at present is that I may diagnose hearing aids and find the fault with the hearing aids, but there are no spares; there are just no spares. I don't have spare microphones, no spare wires—the leads that connect the microphones as well as the receivers to the amplification system—yes, all those things are not available.

As has already been stated, spare parts for hearing aids are not locally available; they have to be imported from outside the country. Technologist 2 indicated that, because of this problem, there is very little that these technologists can do to repair some of the malfunctioning hearing aids. What is evident is that is that both technologists are experts, but they cannot effectively function because of this lack of spare parts.

Summary

The two hearing-aid technologists expressed dissatisfaction with their lack of recognition by the Ministry of Education and Culture as technologists; they feel that they are recognized only as teachers who also have technical knowledge of hearing aids. They felt that they are misunderstood by their heads of schools, which makes it hard for them to operate as effective specialists, especially in procuring spare parts which are, in fact, not locally available. Both hearing-aid technologists felt that if earmould materials were made available, a number of improper-fit and whistling problems could be minimised because they would be able to make proper-fitting earmoulds that would allow children to benefit from wearing their hearing aids. According to the interviewees, if spare parts are made available, many problems with hearing aids caused by wear and tear could be solved.

Interview with a Principal Lecturer of the Special Education Department at the United College of Education

Because most of the teachers in special schools and integrated units graduated from the United College of Education, it was also imperative to hear from the trainers about what they think about their graduates' work in schools.

Interview questions with the senior member of the Special Education Department centred on (a) the adequacy of hearing-aid *content* in the course at U.C.E., (b) students' *use of acquired knowledge and skills* when they leave the College and operate in their schools, (c) *follow-up*, and (d) the Department's view of whether or not children who wear hearing aids *benefit*.

In regard to the adequacy of hearing-aid content, the respondent said: "Courses in audiology in other countries are split. Hearing aids is a full course on its own." In contrast, this course at the United College of Education is just a small component of a larger course. The respondent went further to explain that

> what we have basically done here is to give the student an idea, a working idea of blending audiology—that is, pure-tone testing—and the use of hearing aids, at least so that he/she has an idea of what the testing and the use of the aid, what really, basically, it has to be doing. But as for the fact that is it adequate, I don't think it's adequate.

This response agreed with the results of questions 28 and 29 on the questionnaire, which I interpreted to mean that teachers actually felt that their knowledge was inadequate. These results may be explained by the fact that I had been their teacher, and they did not want to admit that the course content was inadequate. However, the responses reflect the course situation at the United College of Education.

On the second question of use of acquired knowledge and skills when students leave the college, the respondent reported:

> This is a double-barrelled question, because when the student leaves United College, he/she is either placed in a situation where he has to make experiments of his own. At that point he has some idea of what a hearing aid can do. But as to what he/she can do, no.

What the respondent indicated is a difficult situation every teacher faces after graduation. The knowledge required would be more than just knowledge of hearing aids in some instances. The teacher would be placed in situations where he/she has to act as an audiologist, a hearing-aid technologist, a counsellor, and so on, and at the same time perform as a classroom teacher. The teacher is not involved in the decision-making process regarding the use of hearing aids despite his/her knowledge and skills.

The question of follow-up is a difficult one for the college because of the shortage of manpower, and "in terms of those out there," the interviewee commented that "I don't think they have an idea. All they know is, 'Here are the aids. Use them.'" The respondent referred to the Ministry of Education and Culture Special Education Department and Psychological Services, which distribute the hearing aids to schools. According to the interviewee, there was no follow-up whatsoever. With inadequate training and insufficient support, teachers become overwhelmed, and the likelihood of abuse and misuse of hearing aids increases.

Regarding the question of the department's view of whether or not children benefit from wearing aids, the respondent stated: "Now, for me, as maybe somebody who really has an idea about hearing aids, I think no." Further explanations from this interview were that "most of everything is donated," and there is no 100% proper fit of hearing aids. Also, there is no proper procedure followed before a child is fitted with a hearing aid. The correct procedure as suggested by the latest audiology information (Bamford & Sanders, 1994) includes testing the child first (air and bone conduction), selecting and making the earmould, fitting the aid, and, lastly, counselling the parents and the children. The situation in Zimbabwe is that children are fitted with hearing aids at schools, and in most cases parents might not be aware that their children are wearing aids unless they visit the school. As one deputy head reported, "Sometimes the child could be fitted with a hearing aid before being tested on the audiometer."

The principal lecturer went on to say: "In most of the schools they do not have proper equipment for testing children; for example, audiometers without bone and speech. If they are there, no calibration has ever been done." He/she wondered, if all these machines which help us determine the levels of the child's hearing loss are not available or not working, why then speak of benefits? It is evident that in the department's view children do not benefit from the aids with which they are fitted because the appropriate procedures for proper fit are not followed.

Summary

In summary, teachers who graduated from the United College of Education were said to have had some elementary audiology training which enables them to test children's hearing loss and handle hearing aids. In practice, as implied by the interviewee, these teachers are not experts but are functionally literate in the use of hearing aids.

Both the questionnaire information and the interview information have provided a fairly comprehensive picture of the hearing-aid situation in Zimbabwe. In some cases information gleaned from the interviews supported the questionnaire data, and in other cases it added important insights.

The following brief chapter will focus on recommendations arising from this research.

Chapter 5

Recommendations and Conclusions

Introduction

This study has used interviews and questionnaires to examine the use of hearing aids in Zimbabwean schools. As a result of the analysis of the data for improvement in hearing-aid management, recommendations can be grouped under three headings: teachers' qualifications, teachers' knowledge level of hearing aids, and attitudes of teachers towards hearing aids and hearing-aid wearers. The information collected allows us to make recommendations about each of these factors as they relate to the use of hearing aids in Zimbabwe and to the direction for future research in this area. Consequently, the recommendations will be presented under the three broad factors that help to enhance the effective use of hearing aids in schools.

Recommendations

Teachers' qualifications. As has been indicated in this study, a number of teachers in some schools and integrated units are qualified, ordinary school teachers but not specialists. There is a need, therefore, to have qualified specialists, because the current educational system in Zimbabwe considers teachers the most knowledgeable professionals to help children benefit from hearing-aid use. This need must be recognized by both Ministries of Education and Culture and Higher Education in order to obtain support financially and materially. Consequently, training facilities for specialists have to be made available at the United College of Education and at the University of Zimbabwe to enhance teachers' qualifications to work with hearing-impaired students. Meanwhile, it is important to investigate support for the training of teachers through inservice-delivery modes. Also, the United College of Education course can be evaluated through research to find out the exact knowledge missing in the content as well as to investigate whether proper delivery strategies for upgrading teachers are employed.

Teachers' knowledge level of hearing aids. The concern and devotion of every teacher in this study was to have more knowledge of hearing aids so as to be able to help children effectively to benefit from hearing-aid use. It would seem very important, therefore, that the course content at U.C.E. include a more practical element on hearing aids. This will also require a comprehensive inclusion of how teachers can monitor hearing-aid functioning. All studies reviewed pointed to the need for monitoring hearing-aid use and functioning. Classroom teachers bear the responsibility of ensuring that children's hearing aids are used properly, both in the classroom and on the playground (Markides, 1989). Teachers of the deaf need this knowledge and training to meet this responsibility. All professionals involved, as well as literate parents, require further training, guidance, and support to ensure that hearing-impaired children are not deprived of the benefits of amplification. This training should be in hearing-aid use and maintenance and should also be directed towards hearing-impaired children. The inclusion of these students in hearing-aid management and maintenance may lead not only to improved functional amplification, but also to greater student empowerment as they assume responsibility for their hearing aids (Lipscomb, Almen, & Blair, 1992). It also means that good habits of hearing-aid use will be encouraged.

However, investigations also have to be done into the problems of donated hearing aids, and knowledgeable teachers and hearing-aid technologists must be given a chance to select suitable equipment for the schools. Problems with batteries must also be investigated with the help of those countries which are already using solar-powered batteries (e.g., Kenya).

Attitudes of teachers towards hearing aids and hearing-aid wearers. As indicated in the results (pp. 45-51), teachers in the schools for the deaf and integrated units have positive attitudes towards hearing aids and hearing-aid wearers. Teachers have also shown their willingness to learn more about children wearing hearing aids. There is some indication from teachers that wearing hearing aids affects students' social and emotional behaviour (questions 19, 20, and 21). Therefore, I recommend that teachers be exposed to counselling children with problems with their hearing aids. From this experience they will socially interact with depressed hearing-impaired children wearing hearing aids and help to solve their problems. Teachers have shown that, with a positive attitude, they can understand hearing-impaired children and the hearing aids which they use. I also recommend that the specialist course at U.C.E. include a social psychology of deafness component to help teachers understand deafness. However, because it is now difficult to measure attitude, I suggest that further research include developing a method of measuring attitude and whether it has any effect on change in individuals' approaches to handling hearing-impaired children.

Recommendations have emanated from three important factors which influence the use of hearing aids in Zimbabwean schools. However, based on information from specific knowledge of hearing aids (questions 1-7), another recommendation must be made: that every educational establishment institute a daily hearing-aid monitoring and troubleshooting programme. Such a programme need not be complicated and time consuming. Each morning the hearing aids should be examined auditorily and visually (see Appendices J, K, and L), supplemented by frequent sound-field and electroacoustic evaluation. Sound-field evaluations include speech-detection threshold, speech reception and recognition in both quiet and noise, best listening levels, uncomfortable listening levels, and localisation ability. Though this recommendation is plausible, issues of earmoulds, proper fitting, and knowledge levels of teachers should be investigated to find a solution which will minimize whistling from improperly fitted earmoulds.

Conclusions

Several issues arose in both the interviews and questionnaires which provide important questions for further research:

1. Does the course at the United College of Education have adequate content on hearing aids?
2. Can staff development be carried out through inservice seminars? When? Does the government support this venture?
3. What effect does speech reading have on hearing-aid use?
4. Who should train as a specialist teacher? For how long?
5. Do all hearing-impaired children need hearing aids?
6. What other methods might help hearing-impaired children communicate and learn?

In conclusion, I would like to stress that training teachers in the practical uses of hearing aids would help to minimize the "double jeopardy" that children wear malfunctioning hearing aids—benefitting not at all at the expense of bettering the amplification.

My study's findings were similar to those of other researchers: that once teachers are knowledgeable in the use of hearing aids, they will help children use them properly; and as well that one might be a qualified specialist but with little knowledge of hearing aids (those with a B.Ed. or M.Ed., as illustrated by the results of Tables 5 and 6) and lacking specific knowledge of hearing-aid controls and how they function. Importantly, this study found that there is expertise in Zimbabwean schools for the deaf—qualified specialists who could efficiently help in the monitoring of hearing aids for the benefit of children; however, in some instances administrative constraints discourage their operation.

This study also found that there is an encouraging sharing of knowledge between qualified specialist teachers for the deaf and other teachers in schools and integrated units, which shows good school-based staff development that is very important in a situation with limited resources.

This investigation has extensively explored the situation of hearing-aid use in Zimbabwe among children who have been identified as having a hearing loss. An important reminder is that this study does not deal with those children who have not yet been identified. As a result, the picture of strengths and weaknesses of hearing-aid use among identified children has been described. The reader is reminded, however, that both early and proper identification is critical.

Considerably more research is required before more definite answers can be found, but the picture as drawn by the participants in this study provides a sound basis from which to explore ways of meeting the needs of all hearing-impaired children in Zimbabwe.

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Appendix A

Letter to Participants

Questionnaire

Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta
T6G 2G5

7 May 1993

Dear Colleague:

The attached questionnaire is designed as part of a thesis which is investigating the use of hearing aids in Zimbabwean Schools for the Deaf and Integrated Units. This is designed in partial fulfillment of an M.Ed. degree in Special Education Hearing Impairment from the University of Alberta in Canada, and the research is being carried out in Zimbabwe in June through August 1993.

This research has been approved by the Ministry of Education and Culture. When you answer this questionnaire, you will not be identified in any way.

Thank you for your assistance.

Yours sincerely,

A. R. Gwitimah

ARG/lp
Attach.

Thesis Title:

Investigation on Hearing Aid Use in Zimbabwean Schools for the Deaf and Integrated Units

Please tick what you feel is the most suitable statement according to your working experiences.

Background Information

1. **Sex:**

   (a) male ____
   (b) female ____

2. **Grades currently teaching:**

   (a) Grades 1-2-3 _ _ _
   (b) Grades 4-5-6 _ _ _
   (c) Grades 7 ____

3. **Years of teaching experience:**

   (a) 1-3 ____
   (b) 4-7 ____
   (c) 8-11 ____
   (d) 12-16 ____
   (e) 17-20 ____
   (f) 21+ ____

4. **Type of teacher certification:**

   (a) PTH
   (b) PTL ____
   (c) T/4 ____
   (d) T/3 ____
   (e) Diploma teachers of deaf ____
   (f) B.Ed.
   (g) M.Ed. ____
   (h) U.C.E. Certificate ____
   (i) T/2 A ____
   (j) T/1 ____
   (k) Other ____

5. **College/university attended:**

   (a) U.C.E. ____
   (b) Bondolfi ____
   (c) Seke ____
   (d) Mkoba ____
   (e) Gwanda ____
   (f) Mutare
   (g) U.Z. ____
   (h) Masvingo ____
   (i) Morgenster ____
   (j) Any other ____

Questionnaire (Lass et al., 1989)

Knowledge of Hearing Aids

A. Please tick what you feel is the most suitable statement according to your working experiences.

1. The voltage of a hearing-aid battery should be approximately
____ (a) 12 volts
____ (b) 1.5 volts
____ (c) 9 volts
____ (d) 6 volts
____ (e) .5 volt
____ (f) none of the above

2. The most common cause of hearing-aid malfunction is in the
____ (a) amplifier
____ (b) earmould
____ (c) volume control
____ (d) battery
____ (e) receiver
____ (f) none of the above

3. The most common cause of a hearing aid 'whistling' while the person is wearing it has to do with the
____ (a) amplifier
____ (b) earmould
____ (c) battery
____ (d) volume control
____ (e) microphone
____ (f) none of the above

4. When a hearing aid battery 'dies,'
____ (a) it does so very quickly.
____ (b) it does so gradually, much the same as the flashlight battery.
____ (c) the hearing aid 'whistling' is an indicator that a new battery is needed.
____ (d) the hearing aid continues to function normally for 24 hours, but a "battery expired" indicator comes on.
____ (e) the hearing aid picks up more power from the dead battery.
____ (f) none of the above.

5. When a hearing aid switch is on the 'T' position,
____ (a) the hearing aid amplifies more than on the other positions at all frequencies.
____ (b) the hearing aid amplifies only high frequencies.
____ (c) the hearing aid amplifies only low frequencies.
____ (d) no sound is amplified at all.
____ (e) the hearing aid is more apt to 'whistle.'
____ (f) none of the above.

6. A properly fit hearing aid
    - ____ (a) will enable the wearer to hear normally.
    - ____ (b) will be of considerable benefit to the wearer but does not provide normal hearing.
    - ____ (c) will actually enable the wearer to hear better than many normal hearing persons.
    - ____ (d) will eliminate problems related to understanding speech in a noisy place.
    - ____ (e) will make the child hear all sounds clearly.
    - ____ (f) none of the above.

7. Earmoulds are normally
    - ____ (a) interchangeable between ears.
    - ____ (b) manufactured in a number of sizes, and the 'closest fit' size is selected for use.
    - ____ (c) custom made for the particular ear in which it is to be used.
    - ____ (d) one style that is easily altered to fit almost any ear.
    - ____ (e) can be bought from any shop and used.
    - ____ (f) none of the above.

B. In this section of the questionnaire encircle True or False for your responses.

8. A hearing aid improves a person's hearing so that after extended use he/she eventually does not have to wear it any more.
    - ____ (a) True
    - ____ (b) False

9. Hearing aids cannot be worn by children under five years old.
    - ____ (a) True
    - ____ (b) False

10. Hearing aids are powered by batteries.
    - ____ (a) True
    - ____ (b) False

11. Anyone with a hearing loss can benefit from a hearing aid.
    - ____ (a) True
    - ____ (b) False

12. The larger the hearing aid, the louder it makes sounds.
    - ____ (a) True
    - ____ (b) False

13. Hearing aids are not useful for individuals who are over 65 years old.
    - ____ (a) True
    - ____ (b) False

14. The more expensive the hearing aid, the better it will improve a person's hearing.
    - ____ (a) True
    - ____ (b) False

15. Hearing aids usually cost much more than eyeglasses.
    ____ (a) True
    ____ (b) False

16. Hearing aids bring hearing back to normal just as eyeglasses bring vision back to normal.
    ____ (a) True
    ____ (b) False

C. Write down your responses as honestly as you can. Tick the correct box for your response.

1 = strongly agree (SA)
2 = agree (A)
3 = neutral (N)
4 = disagree (D)
5 = strongly disagree (SD)

	1 SA	2 A	3 N	4 D	5 SD
17. I feel uncomfortable when I talk to people who wear hearing aids.					
18. Hearing aids are usually a worthwhile expense for hearing-impaired persons.					
19. Children who wear hearing aids tend to feel sorry for themselves.					
20. Children who wear hearing aids tend to be embarrassed about their hearing aids.					
21. Children who wear hearing aids are socially more restricted than those who do not wear hearing aids.					
22. Children look older when they wear hearing aids.					
23. Many children who wear hearing aids do not really need them.					
24. Lip reading can eliminate the need for a hearing aid in most cases, but requires a lot of effort.					
25. Children who wear hearing aids generally are more intelligent than those who do not wear hearing aids.					
26. I would wear a hearing aid if it were recommended to me.					
27. Considering your professional area, do you feel that academic training in hearing aids is necessary?					

	1 SA	2 A	3 N	4 D	5 SD
28. The academic course work on hearing aids you received from training was adequate.					
29. During training, classroom preparation in the area of hearing aids was adequate.					
30. During teacher training, there is no need to study about hearing aids and how they should be fitted to children.					

D. Below are some statements to which you can respond by ticking the box representing your perception.

1 = very poor (VP) 2 = less than adequate (LTA) 3 = adequate (A)
4 = more than adequate (MTA) 5 = insufficient information (ISI)

	1 VP	2 LTA	3 A	4 MTA	5 ISI
31. How would you rate your knowledge on troubleshooting hearing aids?					
32. So far, your knowledge on hearing aids is . . .					
33. Fitting of hearing aids for you as a skill is . . .					
34. Knowledge of selection of hearing aids for you as a teacher you feel is . . .					

Appendix B

Letter of Approval to Do Research in Zimbabwe From the Ministry of Education and Culture, Government of Zimbabwe

Telephones: [illegible]
Telegraphic Address: "EDUCATION"

All communications should be addressed to
"The Secretary for Education and Culture"

ZIMBABWE

Reference: C/426/3

MINISTRY OF EDUCATION AND CULTURE
P.O. Box 8022
Causeway
Zimbabwe

7 April 1993

Mr A.R. Gwitimah
Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton
Canada T6 G 265

Dear Sir

APPROVAL OF APPLICATION TO RESEARCH IN SCHOOLS

Your application to carry out research in institutions under the Ministry of Education and Culture's jurisdiction into "The use of hearing aids in Zimbabwean Schools for the Deaf and Integrated Units" has been approved.

Please contact the Regional Director/s of the regions where the schools you wish to visit are located and produce this letter.

The Ministry would be grateful for a copy of your completed research report which may contain information useful to the development of education in Zimbabwe.

L.D. Nziramasanga

L.D. Nziramasanga
D.C.E.O. Standards Control Unit
for : SECRETARY FOR EDUCATION AND CULTURE

B/BT

Appendix C

Letters of Notification to Regional Directors of Four Educational Regions

Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta
T6G 2G5

The Regional Director
Attention: DRD Primary
P.O. Box 737
Gweru, Zimbabwe

Dear Sir/Madam:

Re: Notification of Research to Be Carried out at
One of the Special Schools - Jairos Jiri Naran Centre

Find enclosed a copy of the letter of approval from the Secretary for Education and Culture.

The focus of the research is on the use of hearing aids in Zimbabwean Schools for the Deaf and Integrated Units.

The research involves conducting interviews with children, teachers, and heads, and administering questionnaires and the Five Sound Test battery.

I would therefore be most grateful if information is relayed to the school concerned. The timeline for visiting the school will be from the beginning of the week ending July 2, 1993.

Thanking you in advance,

Yours sincerely,

A. R. Gwitimah

Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta
T6G 2G5

The Regional Director
Attention: DRD Primary
P.O. Box 555
Bulawayo, Zimbabwe

Dear Sir/Madam:

Re: Notification of Research to Be Carried out at One of the Special Schools - KG VI, Baines Unit, Mtshede Unit and Insukamini

Find enclosed a copy of the letter of approval from the Secretary for Education and Culture.

The focus of the research is on the use of hearing aids in Zimbabwean Schools for the Deaf and Integrated Units.

The research involves conducting interviews with children, teachers, and heads, and administering questionnaires and the Five Sound Test battery.

I would therefore be most grateful if information is relayed to the school concerned. The timeline for visiting the school will be from the beginning of the week ending July 11, 1993.

Thanking you in advance,

Yours sincerely,

A. R. Gwitimah

Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta
T6G 2G5

The Regional Director
Attention: DRD Primary
P.O. Box 8335
Harare, Zimbabwe

Dear Sir/Madam:

Re: Notification of Research to Be Carried out at One of the Special Schools - Emerald Hill School for the Deaf and St. Giles School

Find enclosed a copy of the letter of approval from the Secretary for Education and Culture.

The focus of the research is on the use of hearing aids in Zimbabwean Schools for the Deaf and Integrated Units.

The research involves conducting interviews with children, teachers, and heads, and administering questionnaires and the Five Sound Test battery.

I would therefore be most grateful if information is relayed to the school concerned. The timeline for visiting the school will be from the beginning of the week ending June 25, 1993.

Thanking you in advance,

Yours sincerely,

A. R. Gwitimah

Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta
T6G 2G5

The Regional Director
Attention: DRD Primary
P.O. Box 89
Masvingo, Zimbabwe

Dear Sir/Madam:

Re: Notification of Research to Be Carried out at
One of the Special Schools - Henry Murray School for the Deaf

Find enclosed a copy of the letter of approval from the Secretary for Education and Culture.

The focus of the research is on the use of hearing aids in Zimbabwean Schools for the Deaf and Integrated Units.

The research involves conducting interviews with children, teachers, and heads, and administering questionnaires and the Five Sound Test battery.

I would therefore be most grateful if information is relayed to the school concerned. The timeline for visiting the school will be from the beginning of the week ending June 18, 1993.

Thanking you in advance,

Yours sincerely,

A. R. Gwitimah

Appendix D

Interview Questions for Heads and Deputy Heads of Schools

Interview Questions for Heads and Deputy Heads of Schools

1. How long have you been heading your school?

2. Tell me, what do you feel about hearing aids? Are they benefitting children at all?

3. As a head of this school, which make of hearing aid do you recommend? Why?

4. How do you acquire hearing aids for the school?

5. What supportive services do you get from the hearing-aid donors? In what form is the service?

6. What is your opinion on teachers' level of knowledge of hearing aids? Could you suggest something?

7. So many hearing aids are donated to your school. Have you tried to select which of them work better for the children?

8. What changes would you like to make as a head in the selection of hearing aids and in gaining more knowledge on hearing aids?

9. Problems? Benefits? Changes? Suggestions?

Appendix E

Interview Questions for Teachers

Interview Questions for Teachers

1. Experiences

(a) How long have you been teaching the deaf?

(b) Where did you train to teach the deaf?

(c) So far, what grade levels have you been teaching? Is it all in one school?

(d) Did you take courses in audiology?

2. Knowledge of Hearing Aids and Use in Class

(a) Tell me about hearing aids in your classroom:

—How many children wear them?

—From where did they come?

—Who fits and fixes hearing aids in your classroom at school?

(b) How comfortable do you feel working with hearing aids?

(c) If a child brings a 'dead' hearing aid to you, what do you do?

(d) Do you feel that children benefit from wearing hearing aids? If so, why?

(e) Would you tell me if you have a good understanding of hearing aids.

3. Problems With Hearing Aids

(a) Tell me about any problems with hearing aids.

(b) Any problems with batteries?

—With earmoulds?

(c) Do you have any problems with whistling? If so, what are the problems?

—How do you handle them?

(d) Sometimes the hearing aid goes 'dead.' Has this ever happened? What did you do about it?

—Or the hearing aid may produce a weak sound. What might that tell you?

—Or the hearing aid may produce wobbly, intermittent sounds! Have you ever experienced this? What was wrong?

4. Changes and Recommendations

(a) What changes would you like to make as a teacher in the selection of hearing aids?

—in gaining more knowledge on hearing aids?

(b) Who decides what types of hearing aids are selected for schools?

—Are you pleased about it?

—How could things be improved?

(c) If you were given money for hearing aids, what would you do?

—Which aids would you buy, and why?

Appendix F

Interview Questions for Hearing-Aid Technologists

Interview Questions for Hearing-Aid Technologists

1. Tell me about yourself since you trained as a hearing-aid technologist.

2. Where and when did you train as a hearing-aid technologist?

3. Tell me, what kind of training did you receive?

4. Who financed the training?

5. Are you practising what you trained for?

6. What kind of problems do you encounter?

   —with teachers?

   —with school administrators?

7. What kind of problems do you have with hearing aids, and how do you try to solve them?

8. So far, how do you assess the use of hearing aids in schools? in integrated units?

9. Are children benefitting at all from wearing these hearing aids?

10. What could be done to improve the situation?

11. Have you ever looked at hearing-aid fitting?

    Are the earmoulds suitable enough?

12. Tell me, do you think children are properly fitted with these aids?

    Has their tolerance level been tested?

    What do you think should be done about children's tolerance level?

Appendix G

Interview Questions for Special Education Staff at U.C.E.

Interview Questions for Special Education Staff at U.C.E.

The Course Content

1. Tell me, how do you feel about the input given on hearing aids in the course? Is it adequate?

2. Do student teachers, after taking the U.C.E. course, use their knowledge of hearing aids when they are in the schools?

3. Is there a form of follow-up to determine whether student teachers use the knowledge which they have been given at the College?

Problems in Schools

1. What do you see as the problems that teachers have?

2. What does the College do to help with the problems encountered by teachers in the use of hearing aids?

3. From the department's (Special Education's) point of view, do you think children are benefitting from wearing hearing aids?

4. What is your honest view of the use of hearing aids in Schools for the Deaf and Integrated Units?

   —Can something be done?

   —Can something be changed?

Appendix H

Types of Hearing Aids

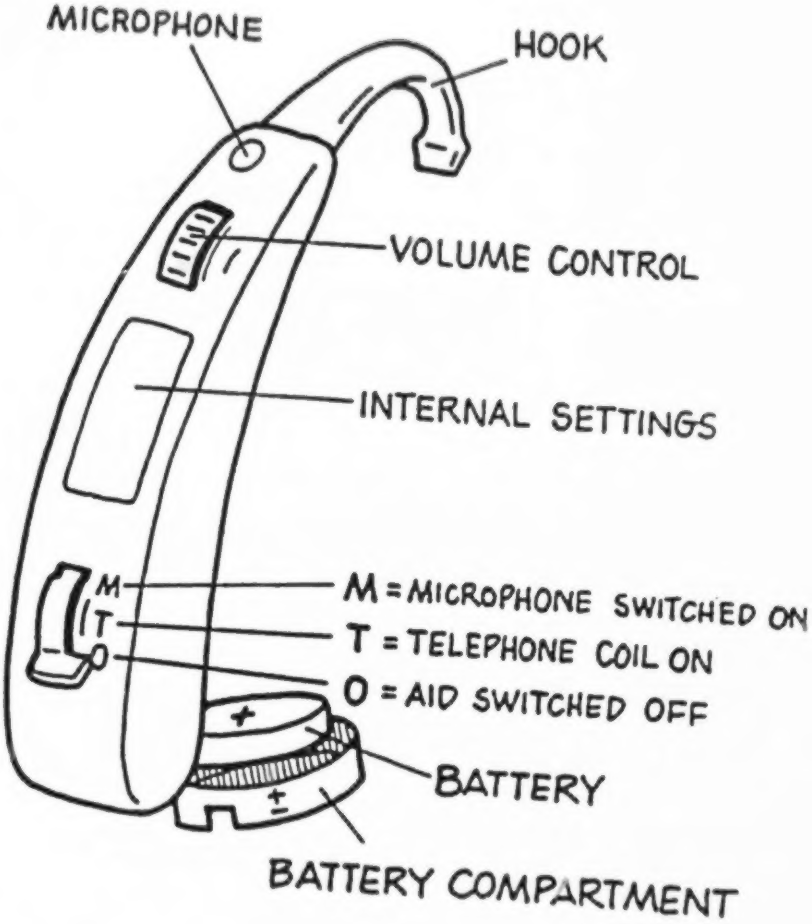
MICROPHONE
HOOK
VOLUME CONTROL
INTERNAL SETTINGS
M
T
O
M = MICROPHONE SWITCHED ON
T = TELEPHONE COIL ON
O = AID SWITCHED OFF
+
±
BATTERY
BATTERY COMPARTMENT

Figure 3. A typical behind-the-ear hearing aid (Phonak India, 1994).

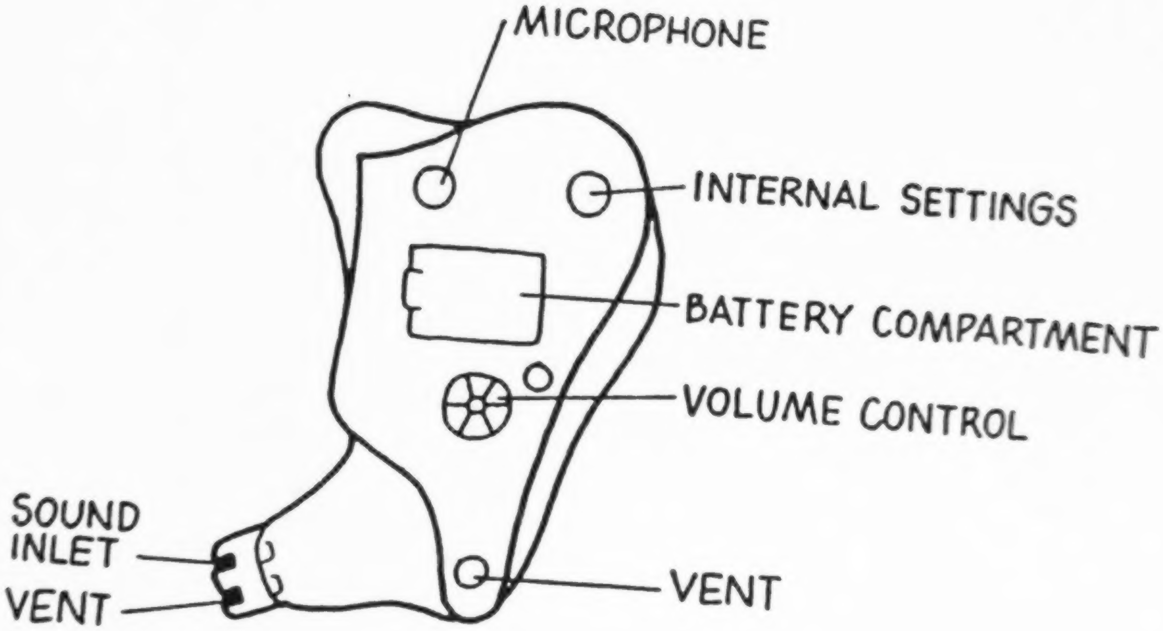
MICROPHONE
INTERNAL SETTINGS
BATTERY COMPARTMENT
VOLUME CONTROL
VENT
SOUND INLET
VENT

Figure 4. A typical in-the-ear hearing aid (Phonak India, 1994.

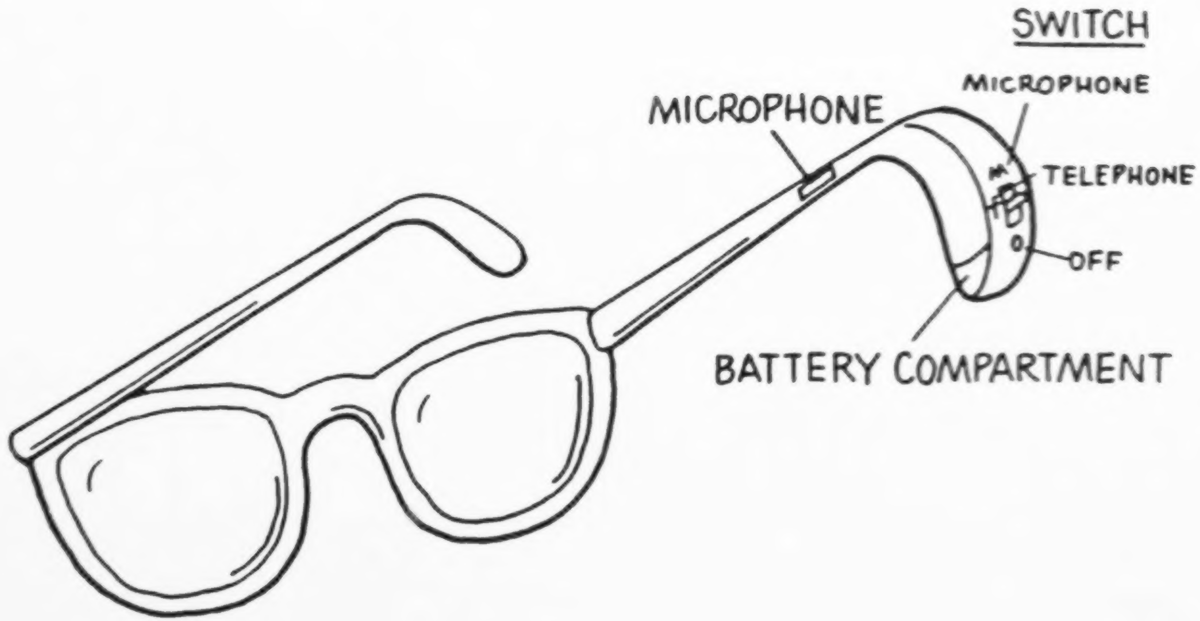
SWITCH
MICROPHONE
MICROPHONE
TELEPHONE
OFF
BATTERY COMPARTMENT

Figure 5. A typical eyeglass hearing aid (Phonak India, 1994).

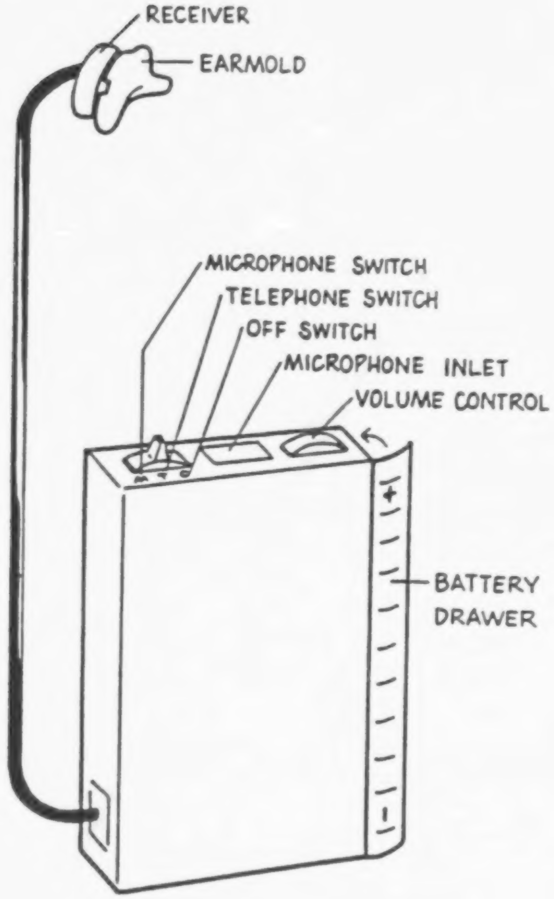
RECEIVER
EARMOLD
MICROPHONE SWITCH
TELEPHONE SWITCH
OFF SWITCH
MICROPHONE INLET
VOLUME CONTROL
+
BATTERY DRAWER
-

Figure 6. A typical body-type hearing aid (Phonak India, 1994).

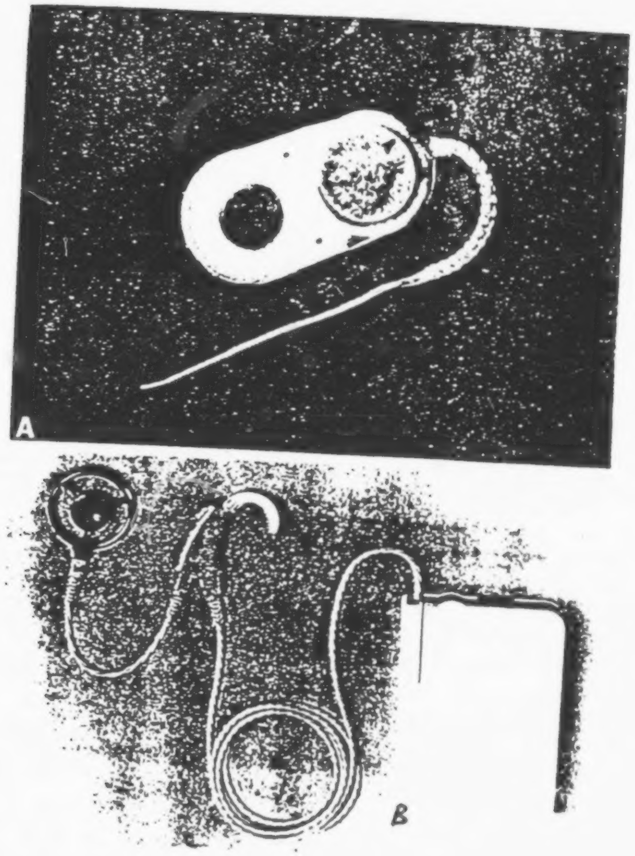

Figure 7. (A) The Mini-22 Cochlear Implant, (B) The Mini Speech Processor (MSP) and microphone headset (Phonak India, 1994).

Appendix I

Letter of Support from the Supervisor to Do Research in Zimbabwe
Letter of Request from the Student to the Sponsors for Financial Help to Do Research in Zimbabwe

January 29, 1993

Mr. Mhlanga
The Z.C.G.T.F.
#726, One Nicholas Street
OTTAWA, ON
KlN 7B7

Dear Mr. Mhlanga:

I fully support the request by Mr. Albert Gwitimah to do his Masters Thesis research in Zimbabwe. The course work that Mr. Gwitimah has done this year has provided an excellent background for his work in hearing aid effectiveness. He has also gained insights in issues related to hearing aids by visiting and observing in several educational settings in Edmonton.

The study of hearing aid effectiveness that Mr. Gwitimah proposes will greatly benefit hard-of-hearing and deaf children and adults in Zimbabwe. If hearing aids are being used, it is essential that they be used effectively. Teachers, administrators, and users themselves must have the necessary practical and theoretical knowledge, and there must be technical and in-service support available. Without this, children are not able to learn to the best of their abilities.

Mr. Gwitimah says that there is no research available in this area in Zimbabwe. He will, therefore, be providing an invaluable service to his field.

If you need further information, please do not hesitate to contact me. I should also mention that we are extremely delighted to have Mr. Gwitimah with us for his studies, and thank you for your continuing support which allows him to pursue advancement in his career.

Sincerely yours,

Mary Ann Bibby
Associate Professor

MAB/lp

Department of Educational Psychology
Faculty of Education
University of Alberta
Edmonton, Alberta, Canada
T6G 2G5

29 January 1993

The Z.C.G.T.F.
Suite 726 - One Nicholas Street
Ottawa, Ontario
K1N 7B7

Dear Mr. Mhlanga:

Re: Request to collect data for Master's
Degree Thesis in Zimbabwe: June 1993 - August 1993

I am writing this letter to you requesting your permission to collect data for my Master's Degree Thesis in Zimbabwe. All the data collection will be in Zimbabwean Schools for the Deaf and the Integrated Units, respectively.

The reasons for my request are that, here in Alberta, Edmonton city in particular, I have been visiting schools for the deaf for my practicum and found that some children, though deaf, do not use hearing aids. This is an area I am interested in for my thesis research. It is critical that I find out if some children in Zimbabwe might also not benefit from hearing-aid use. Secondly, my working place is in Zimbabwe, so if I do my research there, it will enhance my professional work; and, realistically, the whole research is to benefit deaf children in Zimbabwean schools. Thirdly, this research will certainly be the first one looking at hearing aids worn by Zimbabwean deaf children, and what I will be researching will be an essential part of the education of deaf children in Zimbabwe.

The research topic is 'A STUDY OF HEARING-AID USE IN ZIMBABWEAN SCHOOLS.' As the topic reads, it requires me to practically find out if deaf children in Zimbabwean schools are benefitting from the many hearing aids donated to the country by different agencies.

The timeline for my data collection will be as follows:

1. June 1-11: Pilot study on interviews and questionnaires at KG VI, Mtshede, Insukamini, and Baines in Bulawayo.
2. June 14-18: Make any amendments to the instruments and communication with my supervisor at the University of Alberta.

. . . . /2

3. June 21-July 2: Dispatch materials to schools and units. The exact plan of action is:

   (a) Week ending July 2: Travel to Gweru Naran Centre School for the Deaf; do the Five Sound Test on a sample of pupils; interview Head, teachers, and some pupils; and distribute questionnaires.

   (b) Week ending July 9: Travel to Harare—Emerald Hill School for the Deaf and St. Giles Rehabilitation Centre; interviews, Five Sound Test, and questionnaires.

   (c) Week ending July 16: Travel to Masvingo—Morgenster School for the Deaf; interviews, Five Sound Test, and questionnaires.

   (d) Week ending July 23: Will be back in Bulawayo at KG VI and integrated units for interviews, Five Sound Test, and questionnaires.

All in all, my pupil sample on the Five Sound Test in all schools and units should come to 250 pupils; interviews with Headmasters should come to about 10; and questionnaires will be distributed to almost 100 teachers plus 10 Headmasters. The total sample comes to *360* subjects.

I hope my request will meet your expectations. Thanking you in advance,

Sincerely yours,

A. R. Gwitimah

ARG/lp

Appendix J

Inspection Checklist: Tables 7 and 8

Table 7

Inspection Checklist A*

	Visual inspection	Auditory inspection
All hearing-aid types		
Battery		
Always use a known, good battery.	- Sufficient voltage under load (1.2 to 1.5 v)? - Inserted upside down? - Corroded? - Bulging surface?	
Battery compartment	- Opens and closes smoothly?	
Battery contacts	- Corroded? - Dirty? - Bent? - Sufficient tension?	
Hearing aid openings		
Microphone opening	- Partially or completely clogged? - Visible signs of damage?	
Receiver opening	- Partially or completely clogged? - Visible signs of damage?	
Basic listening tests		
Gain check		- Estimate gain. Is hearing aid performing up to expected level?
SSPL/MPO check		- Judge loudness. Is hearing aid performing up to expected level? Is SSPL/MPO appropriate for gain category?
Frequency response check		- Judge frequency response category. Is hearing aid performing as expected? - Judge high-frequency fidelity. Are all speech sounds clearly amplified?
Signal-to-noise-level check		- Is the signal-to-noise level acceptable?
Distortion check		- Are all speech sounds clear and easy to understand?
Housing	- Any cracks or splits? - Dents? deformities? - Loose or missing screws? - Visible signs of damage?	- Using feedback squeal, listen while gently pressing, twisting, squeezing, shaking. Any intermittencies?

(table continues)

	Visual inspection	Auditory inspection
Volume control	- Rotates easily? - Dirty?	- Using stethoscope, listen while adjusting volume from low to high and from high to low. - Press gently on dial in all directions. - Even taper? scratchy? static? intermittent?
Switches Check each switch position at several volume dial settings.	- Switches move easily from one position to the next? - Each position distinct from the others?	
"On" or "M" position		- Press gently on the switch in all directions. Scratchy? static? intermittent?
"T" position		- No environmental noise should be heard. - Using inductive input (e.g., telephone), telecoil hum or buzz may be heard.
"Off" position		- Press gently in all directions. Intermittent? - No environmental noise or hum should be heard. - Press gently in all directions. Intermittent? - Volume control should have no effect.
Variable controls	- Set at proper setting for user?	- Even taper? - Press gently in all directions. - Intermittent? scratchy? static?
Behind-the-ear (BTE) (instruments)		
Earmould	- Partially or completely clogged with wax? - Good hygiene? - Proper fit: loose? tight? uncomfortable? - Cracked or rough edges? - Moisture?	- Feedback? - Weak sound?

(table continues)

	Visual inspection	Auditory inspection
Earhook	- Partially or completely clogged? - Cracked or split? damaged or worn? - Attachment to hearing aid too loose? - Moisture problems?	- Feedback? - Weak sound?
Tubing	- Cracked? brittle? stiff? crimped? - Loose attachment in earmould? - Loose at earhook? - Moisture? - Partially or completely clogged?	- Feedback? - Weak sound?
Body aids		
Cords	- Frayed? chewed? worn? twisted? knotted? - Prongs bent? - Loose plug connections?	- Intermittent? - Static? - Distortion?
External receiver	- Cracked? damaged? - Firmly attached to earmould? - Firmly connected to cord?	- Intermittent? - Static? - Distortion?

* Duhamel, G., & Yoshika, P. (1992). Subjective listening techniques for assessing hearing aid function. *The Unitron Report.*

Table 8

Inspection Checklist B*

	Visual inspection	Auditory inspection
All aids		
Battery	- Sufficient voltage? battery intact? - Contacts clean, with sufficient tension? - Compartment opens and closes smoothly?	- No feedback when the aid is turned on with an open mold and a fresh battery? - Any motor-boating, buzz, or oscillation that goes away when the battery is changed?
Microphone & receiver opening	- Partially or completely clogged? - Any visible signs of damage?	
Housing	- Any splits, deformities, damage, loose or missing screws?	- Listen to feedback while gently shaking and twisting the housing. Any intermittencies?
Volume control	- Rotates smoothly?	- Listen with stethoscope while rotating and pressing on the volume control when the aid is on. Any intermittencies? static? scratchy? even volume taper?
Switches	- Switches intact? Switch moves easily to clearly distinct positions?	- *'O'* or *'Off'* no environmental noise or hum, manipulation of case and volume control should have no effect. - *'T'* no environmental noise (unless an *'MT'* switch); should hear a clear signal from a loop system, 60Hz. - noise from TV or amp. - *'M'*, *'I'*, or *'ON'* when manipulating the switch, any static? intermittent?
Sound quality		- Is the hearing aid abnormally weak? - Are speech sounds unclear or distorted? - Any buzzing, static, internal feedback?

(table continues)

	Visual inspection	Auditory inspection
BTE aids		
Earmold	- Soundbore clear of wax and moisture? - Any cracks, rough edges? - Is mold too tight or too loose?	- Feedback when the soundbore is blocked? - No feedback or weak when bore is open?
Earhook	- As above. Loose attachment to housing?	- As above.
Tubing	- As above. Loose attachment to the mold? - Loose attachment to the earhook? - Brittle? crimped?	- As above.
Body aids		
Cords	- Worn, frayed, or twisted? - Loose connections or bent prongs?	- Any static or distortion? - Intermittent signal?
External receiver	- Cracked or damaged? - Loose attachment to cord or mold?	- As above.
Earmold	- Soundbore clear of wax and moisture? - Any cracks, rough edges? - Is mold too tight or too loose?	- Feedback when the soundbore is blocked? - No feedback or weak when bore is open?
FM systems		
Housing	- Any splits, deformities, damage, loose or missing screws?	- Listen to feedback while gently shaking and twisting the housing. Any intermittencies?
Volume control	- Rotates smoothly?	- Listen with stethoscope while rotating and pressing on the volume control when the aid is on. Any intermittencies? static? scratchy? even volume taper?
Switches	- Switches intact? Switch moves easily to clearly distinct positions?	- Any combination fail to operate?

(table continues)

	Visual inspection	Auditory inspection
Environmental		- Speech sounds distorted? Any static? Intermittent? - Any environmental sounds when 'Off'?
FM reception		- As above.
'Off'		- No environmental noise or hum; manipulation of case and volume control should have no effect.
Telecoil	- Any visible sign of damage, cracks, or splits? loose connection to housing?	- Absent or poor quality signal from the aid when set to *'T'* or *'MT'* when the aid is in the loop field?
Direct input cord	- Any visible sign of damage, cracks, or splits? loose connection to housing?	- Absent or poor quality signal from the aid when connected to the input cord when switches are set correctly?
Cord attachment	- Loose connection to the aid or the aid's boot? wrong cord or boot for child?	- Any static or intermittencies when the connections are manipulated?
Microphone/crystal check	- Coloured dots do not match the dots on the microphone? wrong type?	- Any crystal fail to work with its matching microphone?
Microphone strength	- Lapel microphone plugged in correct socket?	- Is any microphone abnormally weak? - Any static, intermittencies, distortion?
Charger	- Any worn wires, bent or dirty contacts? - Do batteries fail to charge or charge slowly? Do batteries fall off? - If possible, assess possible shock hazard and voltage delivered.	

* Stubblefield, J. (1988). *A manual for helping the "non-audiologist" perform valid and accurate tests.* Tulsa, OK: Modern Education Corporation.

Appendix K

Troubleshooting Checklist: Tables 9 and 10

Table 9

Troubleshooting Checklist A*

Symptom	Possible Cause	Possible Remedy
Weak gain	- Low battery	- Replace battery.
	- Poor battery contacts	- Clean contacts. - Check and readjust tension. - Send for repair.
	- "On" switch intermittent	- Clean "On" switch. - Send for repair.
	- Volume control contacts dirty or defective.	- Clean volume control. - Send for repair.
	- Control settings reduced from test position. - tone - volume - gain - compression	- Set controls to normal test position and recheck gain.
	- Microphone opening clogged or plugged	- Carefully unclog the microphone opening. - Send for repair.
	- Damaged microphone	- Send for repair.
	- Gain amplifier malfunction	- Send for repair.
	- Excessive earwax in ear canal	- Send user to have earwax removed.
Weak output (SSPL/MPO)	- Low battery	- Replace battery.
	- Poor battery contacts	- Clean contacts. - Check and readjust tension. - Send for repair.
	- Receiver opening plugged or clogged.	- Carefully unclog receiver opening. - Send for repair.
	- BTE - earhook	- Clean or replace earhook.
	- tubing twisted or crimped	- Straighten or replace tubing.
	- Control settings reduced from normal test position. - volume - SSPL/MPO - compression	- Set controls to normal test position and recheck SSPL/MPO.
	- Damaged receiver	- Send for repair.
	- Power amplifier malfunction	- Send for repair.
	- Excessive earwax in ear canal	- Send user to have earwax removed.

(table continues)

Symptom	Possible Cause	Possible Remedy
Dead, no sound	- Dead or low battery	- Replace battery.
	- Battery inserted upside down.	- Insert battery matching "+" and "-" contacts.
	- Not switched "On"	- Set switch to "On" or "M" position.
	- Switch set at "T" position.	- Set switch to "On" or "M" position.
	- Poor battery contacts.	- Clean contacts. - Check and readjust tension. - Send for repair.
	- Plugged sound channel - receiver opening - earmould - BTE - earmould - tubing twisted or crimped	- Carefully unclog openings. - Straighten or replace tubing. - Clean or replace earhook.
	- Faulty "On" switch	- Send for repair.
	- Faulty volume control	- Send for repair.
	- Damaged receiver	- Send for repair.
	- Faulty wiring or amplifier malfunction	- Send for repair.
	- Excessive earwax in ear canal	- Send user to have earwax removed.
Feedback, squealing, whistling	- Loose earmould fit	- Build up or remake earmould.
	- Earmould not inserted properly	- Insert correctly.
	- Hand, hat, or other object too close to the hearing aid	- Reposition object.
	- Volume control set too high	- Reduce volume control setting and check whether adequate gain is provided.
	- Internal feedback	- Send for repair.
	- Excessive earwax in ear canal	- Send user to have earwax removed.
	- BTE earhook loose and/or cracked	- Replace earhook and/or tubing.
	- Body aid receiver and ear mould connection	- Use washer or replace earmould snap.
Intermittent	- Low battery	- Replace battery.
	- Poor battery contacts	- Clean contacts. - Check and readjust tension. - Send for repair.
	- "On" switch intermittent	- Clean "On" switch. - Send for repair.
	- Volume control intermittent	- Clean volume control. - Send for repair.
	- Damaged wiring, faulty amplifier	- Send for repair.

(table continues)

Symptom	Possible Cause	Possible Remedy
	- Damaged microphone or receiver	- Send for repair.
	- Moisture	- Allow hearing aid to dry. - Use silica-gel dry air kit regularly.
	- Body aid cord damaged or worn	- Replace cord.
Poor sound quality, distorted, noisy, buzzing, muffled, scratchy, hollow, echo	- Low battery	- Replace battery.
	- Poor battery contacts	- Clean contacts. - Check and readjust tension. - Send for repair.
	- "On" switch connections dirty	- Clean "On" switch. - Send for repair.
	- Switch set at "T"	- Set switch at "On" or "M."
	- Volume/trimmer control settings inappropriate	- Readjust control settings.
	- Volume control connections dirty	- Clean volume control. - Send for repair.
	- Moisture in hearing aid or ear mould	- Allow hearing aid and earmould to dry. - Use silica-gel dry aid kit.
	- Earmould venting inadequate	- Add pressure-relief vent. - Enlarge existing vent.
	- Microphone or receiver clogged, damaged, or malfunction	- Carefully unclog openings. - Send for repair.
	- BTE earhook, tubing, or ear mould clogged	- Clean sound channel.
	- Body-aid cord worn or damaged, loose connections at aid or external receiver	- Replace cord.
	- Body aid receiver damaged	- Replace external receiver.

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* Duhamel, G., & Yoshika, P. (1993). Troubleshooting common hearing aid problems. *The Unitron Report*.

Table 10

Troubleshooting Checklist B*

Problem	Possible cause	How to fix it
Hearing aid doesn't work at all.	Wrong switch setting	Check to see if the switch is on "OFF" or "Telephone" instead of "Microphone."
	Wrong size battery	Change the battery.
	Battery upside down in case (backwards).	Make sure "+" side of the battery matches"+" on the battery case.
	Brown battery leakage	Change the battery. Wipe battery case and clean it with a pencil eraser.
	Dead battery	Test battery; replace the battery if necessary.
	Wax in earmold opening	Push wax out with a pipe cleaner or pin.
	Plastic tube sharply bent or twisted	Untwist the tube.
Sounds are softer than usual.	Cold temperature	If your aid has been in very cold temperatures, it may not work well until it warms up to room temperature.
	Wrong control setting	Check to see if you have accidentally changed the tone or power control settings. If you have, see the audiologist.
	Your health	If you have a bad cold or a lot of wax in your ear, see a doctor.
	White powder on battery	Remove the powder with a soft cloth. Test the battery.
	Weak battery	Test the battery; replace the battery if necessary.
	Earmold not in correctly	Look in a mirror to see if your earmold is all the way in your ear.

(table continues)

Problem	Possible cause	How to fix it
	Plastic tube sharply bent or twisted	Untwist the tube.
	Wax in earmold opening	Push the wax out with a pipe cleaner or pin.
Hearing aid goes on-and-off and has scratchy sound.	Dirt and dust around volume control.	Wipe hearing aid off with a soft dry cloth. Move the volume control gently back and forth a few times.
	Loose cord	If you have a body aid, wiggle the cord where it attaches to the aid to see if it is loose. Push cord into aid tightly.
	Broken cord	If you have a body aid, listen to the sounds as you run your fingers along the cord. Also look for weak spots along the cord. Replace the cord if necessary. It is a good idea to have an extra cord.
	Dirty battery	Rub a pencil eraser across both flat sides of the battery when it is out of the hearing aid.
Hearing aid has feedback (a whistling sound).	Microphone covered	Check that your hair, hair band, hat, or scarf does not cover the microphone opening.
	Loose parts	If you have a body aid, check that the button receiver fits tightly into the earmold ring.
	Position of body aid	If you have a body aid, try wearing the body pack on the opposite side to the ear with the earmold.
	Crack in hearing aid case	Take the aid to an audiologist.
	Something loose inside the hearing aid	Take the aid to an audiologist.
	Earmold not in correctly	Look in a mirror to see if your earmold is all the way in your ear.

(table continues)

Problem	Possible cause	How to fix it
	Earmold does not fit correctly	If your earmold feels loose and moves around a lot when you talk or chew, you may need a new earmold impression.
	Hole in tube	Check plastic tube and hook for a hole or a crack. See an audiologist to replace tube or hook.
	Wrong thickness tube	Ask an audiologist if your plastic tube is "thick-walled." If not, have the tube replaced with a "thick-walled" tube.

Sometimes feedback cannot be avoided.

- When you put your hand next to your ear or stand next to a wall, a very powerful behind-the-ear aid will have feedback. This cannot be avoided.

- The behind-the-ear, eyeglass, and in-the-ear aids sometimes have feedback. They are each very small hearing aids. When the microphone and the receiver are very close together (like they are in a small hearing aid), you sometimes get feedback. This cannot be avoided. You can avoid feedback by using a CROS or a body aid.

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* *Parent-infant communication 1985.* (Handout.) Parent Auditory Development Series Objectives 2 and 3.

Appendix L

Total Looking/Listening Check for Hearing Aids

Table 11

Total Looking/Listening Check for Hearing Aids*

Component	Looking	Listening (use sounds /a/ /u/ /i/ / ʃ / /s/)
Earmold	Opening clear? Cracks, rough areas?	
Battery	Read voltage (replace at 1.1. or below)—Compartment clean?	
Case	Cracks? Separating?	Press case gently—Interruption in amplification?
Microphone	Clean? Visible damage?	
Dials	Clean? Easily rotated?	Rotate—Reasonable gain variation? Static?
Switches	Clean? Easy to move?	Turn on and off—Static?
Cord (body aid)	Cracked? Frayed? Connection plugs clean?	Run fingers down cord—Interruption in amplification? Connections tight?
Tubing (ear-level aid)	Cracks? Good connection to mold and aid? Moisture? Debris?	Cover opening of earmold and turn to maximum gain—Feedback?
Receiver (body aid)	Cracks? Firmly attached to earmold snap ring?	Distortion? Static? Reduced gain? Substitute spare receiver and recheck.
Oscillator (bone aid)	Cracks? Plug clean? Attached well to band?	Listen with oscillator on mastoid, ears plugged to block air-conducted sound.
Variable controls	Proper SSPL, frequency response, gain setting?	5 speech sounds clearly amplified? Gain sounds normal for this aid?
Distortion		Clear quality?
Feedback	Recheck receiver snap, tubing,	Turn to maximum gain to check—External feedback? Internal?

Replace aid and check fit of the earmold to the child's ear.

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* Potts, P., & Greenwood, J. (1983). Hearing aid monitoring. *Language, Speech, and Hearing Services in Schools, 14,* 163.

Appendix M

Explanatory Notes on the Use of *Hearing Impaired* and *Deaf*

Explanatory Notes on the Use of *Hearing Impaired* and *Deaf*

Throughout this proposal and the research report itself, these two terms will be used interchangeably. The National Disability Survey of 1981 in Zimbabwe indicated that the deaf or hearing-impaired people agreed with the terminology. The same situation was revisited in 1990 when the deaf or hearing-impaired community formed the Association of the Deaf (ASOD). The Association endorsed the use of both terms interchangeably.

Appendix N

Explanatory Notes on Types of Certification

Explanatory Notes on Types of Certification

(N.B.: Most of these certification levels are no longer offered in Zimbabwe.)

PTL: Primary Teachers Lower: This was a qualification attained by teachers after training to teach lower Grades 1-3. These teachers went for training after eight years of primary education. The training took two years.

PTH: Primary Teachers Higher: A qualification attained to teach Grades 4-7. Those who trained would have done eight years of primary education plus two years of secondary education (junior level).

T/4: This was training meant for women only to teach infant children, especially Grades 1-2. It was a qualification obtained after two years of training. The level of education for training was either eight years of primary education (Standard Six) or two years of secondary education.

T/3: This was a type of certification obtained after three years of training. Those who trained would have done eight years of primary education plus either two years or four years of secondary education. Teachers with this qualification could teach Grades 1-7.

U.C.E.: This is a specialist course offered to teachers who have done four years of secondary education plus recognized training (e.g., T/3, etc.). It is a one-year intensive course. Teachers have to specialize in any of the three areas (i.e., hearing impaired, mentally retarded, or visually handicapped). Teachers in this study are trained to work with hearing-impaired children. After this course teachers are awarded a diploma in special education.

C.E.: Certificate in Education: a qualification that teachers obtain after three years of training. Teachers trained in this course would have done four or six years of secondary education. (Since 1992 this course has changed to D.E.—Diploma in Education.)

Diploma: This refers to the diplomats who graduated from overseas institutions (e.g., U.K.: Manchester University, University of Newcastle, etc.). This is a one-year course in deaf education.

B.Ed.: Bachelor of Education degree offered by the University of Zimbabwe and other overseas institutions. This is usually a three-year course with content in education and special education focussing on individual interests.

M.Ed.: Master of Education degree in special education (not offered by the University of Zimbabwe at the moment). One can obtain an M.Ed. degree in education but not in special education. Most of those who have an M.Ed. in special education obtained it outside the country.

N.B.* A dual combination of above as indicated means that one will have obtained, for example, U.C.E. + diploma or T/3 + U.C.E. or T/3 + B.Ed. or B.Ed. + M.Ed., etc.